JULY • 1947

TOOL & DIE JOURNAL

DESIGN, MANUFACTURE AND USE OF PRODUCTION TOOLING

Ball Ends

ANOTHER

Complete

PUTNAM LINE

42 DIFFERENT ball end mills in long and regular lengths — *and all standard!* They range from ⅛" to 1½" diameters—available in right- or left-hand cuts. All regularly stocked at Putnam Distributors for fast delivery to you when you need them. In ball end mills, as in all other types, Putnam offers the country's largest and most complete selection.

Keep "on the ball" with faster-cutting, longer-lasting Putnam End Mills — call your distributor today!

PUTNAM TOOL COMPANY

2985 CHARLEVOIX AVENUE • DETROIT 7, MICHIGAN

What jobs have you for CARMET to do?
Here's an Example!
Plunger, Bearing and Cutting Die, made of CARMET Carbide
Allegheny Ludlum Steel Corporation
CARBIDE ALLOYS DIVISION, Ferndale (Detroit) Michigan

"HARDSTEEL"

...EVEN *Work-Hardening Manganese Steels-*

present no problem to **"HARDSTEEL"** *Drills*

● "HARDSTEEL" drills are designed primarily for drilling hardened steels. However, the heat and abrasion resisting characteristics of "HARDSTEEL" enable it to solve many other difficult problems, such as drilling work-hardening manganese steels. On the job illustrated, that of drilling a 17% manganese steel rail, ordinary high-speed drills quickly burned when work-hardening set in, or when "hard spots" or manganese segregations were encountered. "HARDSTEEL" drills did the job easily —at an average time of 2 minutes per hole!

"HARDSTEEL" may solve your problem.

Remember — for best results **USE COOLANT WHEREVER POSSIBLE!**

Write for your copy of the "HARDSTEEL" Operator's Manual.

Learn how to drill hardened steels without annealing, and how to use "HARDSTEEL" tools for difficult jobs.

BLACK DRILL CO., Division of BLACK INDUSTRIES
1368 EAST 222nd STREET CLEVELAND 17, OHIO

"HARDSTEEL"
DRILLS • TOOL BITS • SPECIALS

TOOL & DIE JOURNAL

CONTENTS

Vol. XIII, No. 4 ● July, 1947

Feature Articles Index	67
Editorial	69
Feature Articles	70
Inform-A-Gram	106 I
Progress-on-Parade	108
Publication Previews	127
Shop Aids	137
Contract Tooling and Production	164
The Curb	166
Advertisers Index	168

EDITORIAL STAFF

E. Willard Pennington.....Editor
Carl F. Benner.....Assistant Editor
Don E. Root.....Associate Editor
Albert W. Ehlers.....Contributing Editor
Carolyn Mason.....Editorial Assistant
Mary Hritz.....Editorial Assistant

PUBLISHER

George J. Huebner

J. K. Gillam.....Assistant Publisher

REGIONAL OFFICES

Chicago 2.....L. B. Hammond
E. T. Ellington
123 W. Madison St., RAndolph 1843
Cleveland 6.....Ray L. Huebner
2460 Fairmount Blvd., FA 4040
Detroit 2.....R. F. Pickrell
314 Stephenson Bldg., TRinity 1-0790
Altadena, Calif. .....M. D. Pugh
2721 N. Marengo Ave., SYcamore 7-2894
New England.....Herman T. Pierik
86 Weybosset St., Providence 3
GAspee 5275
New York 17.....H. Thayer Heaton
415 Lexington Ave., MUrray Hill 2-1647

CBI

Controlled Circulation—CBI Coverage

Tool & Die Journal is published monthly for those industry key men who constitute, in each plant, the Cycle of Buying Influence —CBI—and who are responsible for the design, manufacture and use of production tooling.

Subscription rate: To Schools, Libraries, Students, and other than CBI, $4.00 per year. Single copies fifty cents.

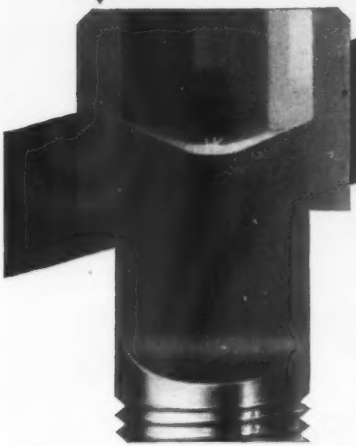
Copyright 1947 by Geo. J. Huebner and R. R. Huebner. Acceptance under the Act of June 5, 1934, authorized October 22, 1942

HUEBNER PUBLICATIONS

Tool & Die Journal · Industrial Plastics
"Die Designing and Estimating"
"Plastics Molds"
· The Know-How Library

George J. Huebner.....Editor-in-Chief
C. L. Saylor.....Manager, Contracts
E. O. Hadden.....Chief Accountant
J. S. Livermore.....Production Manager
Russell E. Eisenhut.....Art Director
S. F. Marino.....Mgr., Direct Mail Div.
M. D. Klein.....Circulation Lists

UNRETOUCHED PHOTO ETCHED CUTAWAY
HOLO-KROME SOCKET HEAD CAP SCREW



Completely Cold Forged

Exclusively Holo-Krome! Continuous Fibres running from end to end—uninterrupted, unbroken and unsevered! Accomplished exclusively by the Holo-Krome patented method of Completely Cold Forging and sold through Holo-Krome Industrial Supply Distributors under the registered trade mark name "FIBRO FORGED" Socket Screws . . . Specify "Holo-Krome" and get these guaranteed unfailing performance Socket Screws.

INTERNAL WRENCHING

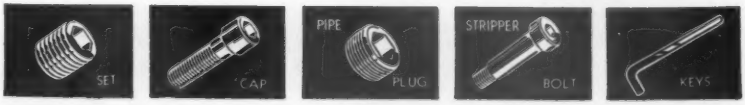
. . . THE BETTER FASTENING METHOD

THE HOLO-KROME SCREW CORP.
Hartford 10, Conn., U. S. A.

HOLO-KROME

fibro forged

INTERNAL SOCKET WRENCHING SCREWS

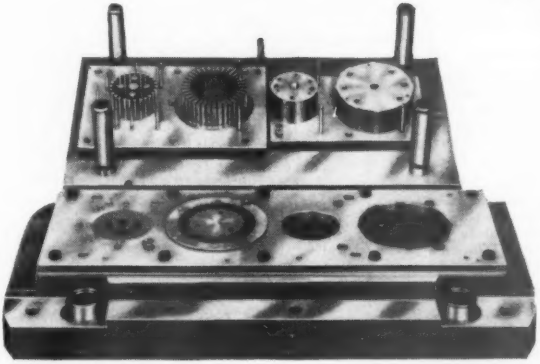


For
RELIABLE, ACCURATE, ECONOMICAL
PUNCH PRESS PRODUCTION
Use DICKERMAN
DIE FEEDS
RELIABLE — Made of high grade accurately machined materials with no complicated parts to get out of order.
ACCURATE — Feed length can be adjusted from 0" to the maximum of 6" in increments of .001". Accurate feed with no troublesome, costly jams.
ECONOMICAL — Set-up time is only a Fraction of that required by other type feeds. Buy several Dickerman Feeds for the price of one roll feed.
Feeds brass, steel, copper, aluminum, paper, mica, rubber, fibre, plastic and others. Thousands in use throughout the country.
Send for Free Catalog Today!
M. E. DICKERMAN MFG. CO.
SPRINGFIELD, MASS.

YOUR PRODUCT DESERVES

The Finest

THE ULTIMATE IN PRECISION WORKMANSHIP



ALSO STAMPING DIES OF ALL TYPES, JIGS, FIXTURES, GAUGES, SPECIAL MACHINE WORK.

A Typical HARIG LAMINATION DIE

View of Part of Our Modern, Highly Efficient Plant

Your Inquiries Invited

HARIG

MANUFACTURING CORPORATION

319 NORTH ALBANY AVE. CHICAGO 12

Now Ready

PLASTICS MOLDS

The New Enlarged Third Edition by Gordon B. Thayer

The Established Authority on the Design, Construction and Use of Plastics Molds

The third edition of *PLASTICS MOLDS*, the widely known, widely used "original plastics mold book", is now available. Greatly augmented—270 pages—over twice as large as the second edition—*PLASTICS MOLDS* by Gordon B. Thayer, B.S.E., Plastics Research Engineer, Dow Chemical Company, contains over 200 illustrations, including many workable drawings, tables and charts.

Practical — Understandable

The entire coverage of the design, construction and use of plastics molds has been revised to keep *PLASTICS MOLDS* abreast of the fast moving developments in the industry. George K. Scribner, President, Boonton Molding Company, writes in the introduction:

"This book is now in its third edition, re-written and brought up-to-date. All the comments I made on the first edition still hold good with the very important added fact that the public demand has given its accolade to Mr. Thayer's presentation."

Publication Price $5.00 Per Copy Prepaid

Special discounts will be allowed on group orders of 10 or more copies from industry organizations.

Use order blank below or your own purchase form

22 Chapters — Over 200 Illustrations

1. INTRODUCTION: DEFINITION, REQUIREMENTS, TYPES, FACTORS
2. SUGGESTIONS ON DESIGN PROCEDURE
3. PRACTICAL POINTS IN MOLD DESIGN AND CONSTRUCTION
4. MATERIALS FOR PLASTICS MOLDS
5. TYPES OF MOLDS FOR COMPRESSION MOLDING
6. THE DESIGN OF A SIMPLE COMPRESSION TYPE MOLD
7. THE DESIGN OF A SPLIT CAVITY COMPRESSION TYPE MOLD
8. THE DESIGN OF A SIDE-OPENING COMPRESSION MOLD
9. DESIGN OF A TRANSFER TYPE MOLD
10. THE DESIGN OF A SIMPLE INJECTION TYPE MOLD
11. THE DESIGN OF A STRIPPER-PLATE INJECTION MOLD
12. THE DESIGN OF A LOOSE-BAR INJECTION MOLD
13. AN INJECTION MOLD FOR A PLASTICS LENS—by Carl H. Whitlock
14. LOADING THE INJECTION MOLD
15. EJECTOR SYSTEMS FOR INJECTION MOLDS
16. MOLD BUILDING METHODS AND EQUIPMENT
17. METHODS OF MOLD SINKING
18. FINISHING METHODS AND EQUIPMENT
19. MOLDING SCREW THREADS IN PLASTICS
20. HARD CHROMIUM PLATING FOR THE PLASTICS INDUSTRY
21. PLASTIC TOOLING
22. ESTIMATING PLASTICS MOLDS

HUEBNER PUBLICATIONS • 416 FAIRMOUNT-CEDAR BLDG. • CLEVELAND 6, OHIO

Gentlemen:

Please send me.....copy (ies) of Gordon B. Thayer's new third edition of PLASTICS MOLDS at $5.00 per copy, prepaid.

Remittance is enclosed ☐ Purchase order is enclosed ☐ Will be forwarded ☐

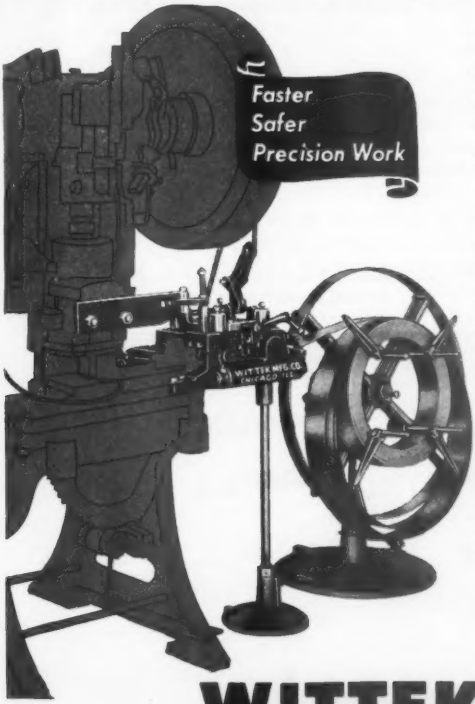
Name.....Title.....

Company.....

Address for mailing "Plastics Molds".....

Planning Peacetime Production Using Coiled Strip Stock?

Equip with
WITTEK
Automatic Roll Feeds and Reel Stands



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

Write for catalog, prices and recommendations

WITTEK
MANUFACTURING CO.
4305-15 W. 24th Place, Chicago 23, Ill.

Automatic
ROLL FEEDS
AND
REEL STANDS

Here They Are In One Handy Box...

The 16 Most Popular Shapes and Sizes of Norton Mounted Points

HANDY to buy, handy to use, handy to keep — that's the Norton No. 16 Mounted Point Assortment. It's made up of one each of the sixteen sizes and shapes which Norton sales records show are most in demand. They're packaged in an ingenious box which brings them to you safely, serves as a handy holder while they are in use and a sturdy container when they are not.

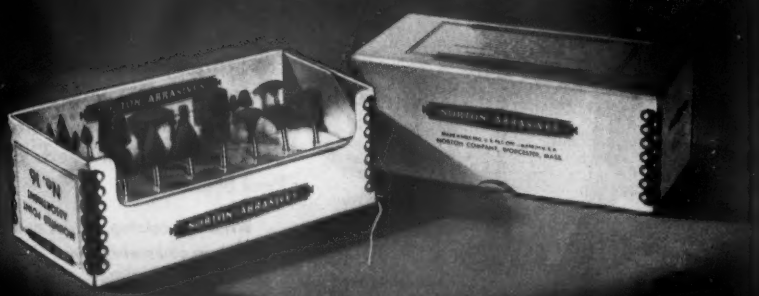
The points are the same Norton product that's been so popular with tool makers for years. They are made of fast, cool cutting 38 ALUNDUM abrasive, vitrified bonded and strongly cemented on steel spindles.

Order one or more No. 16 Mounted Point Assortments from your Norton distributor.

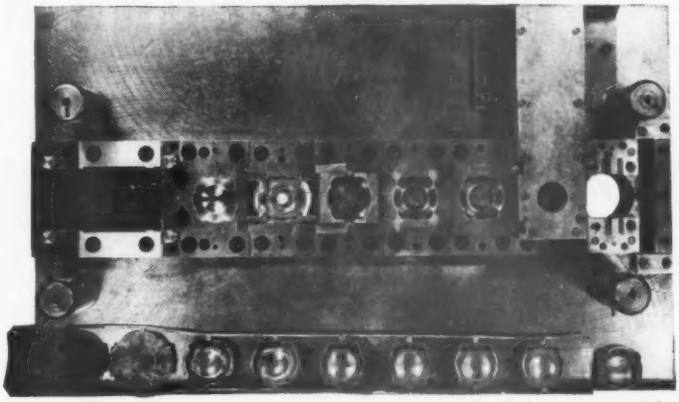
NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

W-1089



Progressive die work simplified with free machining Graph-Mo steel



Die for progressively producing oil filler caps

PRODUCING intricate progressive dies is specialized work. But it *can* be simplified.

For example, The Northeastern Tool & Die Corporation, Detroit, Michigan, has simplified its die work on all draw operations by using Timken Graph-Mo—a special oil hardening steel with remarkable free machining and non-deforming characteristics. Because Graph-Mo contains free graphite it can be machined 25% to 30% faster than other oil hardening steels. Production is stepped up, production and maintenance costs whittled down.

But that isn't all! Graph-Mo has also helped these progressive die specialists improve the quality of their dies. (Customers are more than satisfied with service life.) Many of them have commented that Graph-Mo has also proven its superiority from the standpoint of non-pick up and scoring.

If you're looking for a steel with exceptional free machining and non-seizing qualities, high resistance to wear and excellent heat treating properties, why not learn more about Timken Graph-Mo today? Write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

BOKUM BORING TOOLS

ACTUAL SIZE
STYLE A
TOOL NO. 12

Let us make up a handy box of large boring tools of your own selection of sizes and styles. The box accommodates nine sizes of high-speed cutting heads in each of the three styles interchangeable on the threaded shanks also furnished.

HERE'S THE TOOL for Boring Large Holes

FAST — ACCURATE — EFFICIENT

It takes heavier bites—permits faster feed—doesn't chatter. Has great advantage over forged tool or boring bit. Has longer life. You regrind only one face. You'll never use any other boring tool, once you start using Bokum.

STYLE A—for general boring, STYLE B—for bottoming and facing, STYLE C—for internal threading.

Ask for catalog S-1139 for high speed steels—
catalog S-398 for carbide tipped

TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO.

14775 WILDEMERE AVE. · DETROIT 21, MICH.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

PRECISION-MADE
for precision performance

Reflecting the vast experience of the world's foremost file manufacturer, Nicholson Rotary Files and Burs are now available in *types, shapes, sizes and cuts for every purpose:*

HAND CUT ROTARY FILES *for use principally on the ferrous metals and other hard materials.*

HIGH SPEED GROUND BURS *for use principally on the non-ferrous metals and other soft materials.*

(⅛" and ⅙" shanks in both Hand Cut and Ground types.)

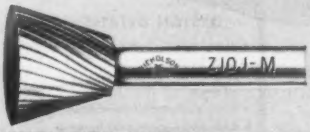
CEMENTED CARBIDE BURS *for extra efficiency and extra-fast metal removal on the long production runs.* (¼" *shanks only.*)

Typical shapes — nearly all in assorted head sizes — are shown below. Your industrial distributor can supply you.

NICHOLSON FILE CO., 95 Acorn St., Providence 1, R. I.
(In Canada, Port Hope, Ont.)

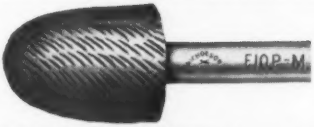
BALL shape in HAND CUT ROTARY FILE *(Illustrated)* and HIGH SPEED GROUND BUR with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

CONE shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

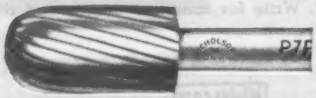


INVERTED CONE shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" shank.

CYLINDRICAL FLAT END shape in HAND CUT ROTARY FILE *(Illustrated)* and HIGH SPEED GROUND BUR with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.



TREE RADIUS END shape in HAND CUT ROTARY FILE *(Illustrated)*, HIGH SPEED GROUND BUR and CEMENTED CARBIDE BUR with ¼" shank.



CYLINDRICAL RADIUS END shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

NICHOLSON ROTARY FILES

HAND CUT AND GROUND *FOR EVERY PURPOSE*

NICHOLSON U.S.A.

HERE IT IS—the new Wells No. 12 Metal Cutting Band Saw with controlled, automatic cutting that reduces operator fatigue, makes better cuts and lengthens blade life. With the new Wells No. 12, just place the stock—bars, rounds, sections or pipe—in the quick-acting vise and push the starting buttons—the machine does the rest. The head comes down automatically, feeding the blade into the stock at a controlled pressure. At the completion of the cut, the head is raised hydraulically to a predetermined position and the motors shut off. Write for complete details and literature.

DESIGN DETAILS

- Heavy duty—suitable for production or general utility.
- Blade is in horizontal position at all times.
- Hydraulic controls for head motion.
- Blade pressure controlled by sensitive micro-switch and solenoid.
- Capacity: rectangular 12" x 16"; rounds, 12" Dia.
- Blade: 1" x .035" x 13' 7"
- Speeds: selective, 50, 90 or 150 ft. per min.
- Motors: ¾ H.P. blade motor, ½ H.P. hydraulic system motor.
- Weight: approximately 1750 lbs.

Wells saws

Wells

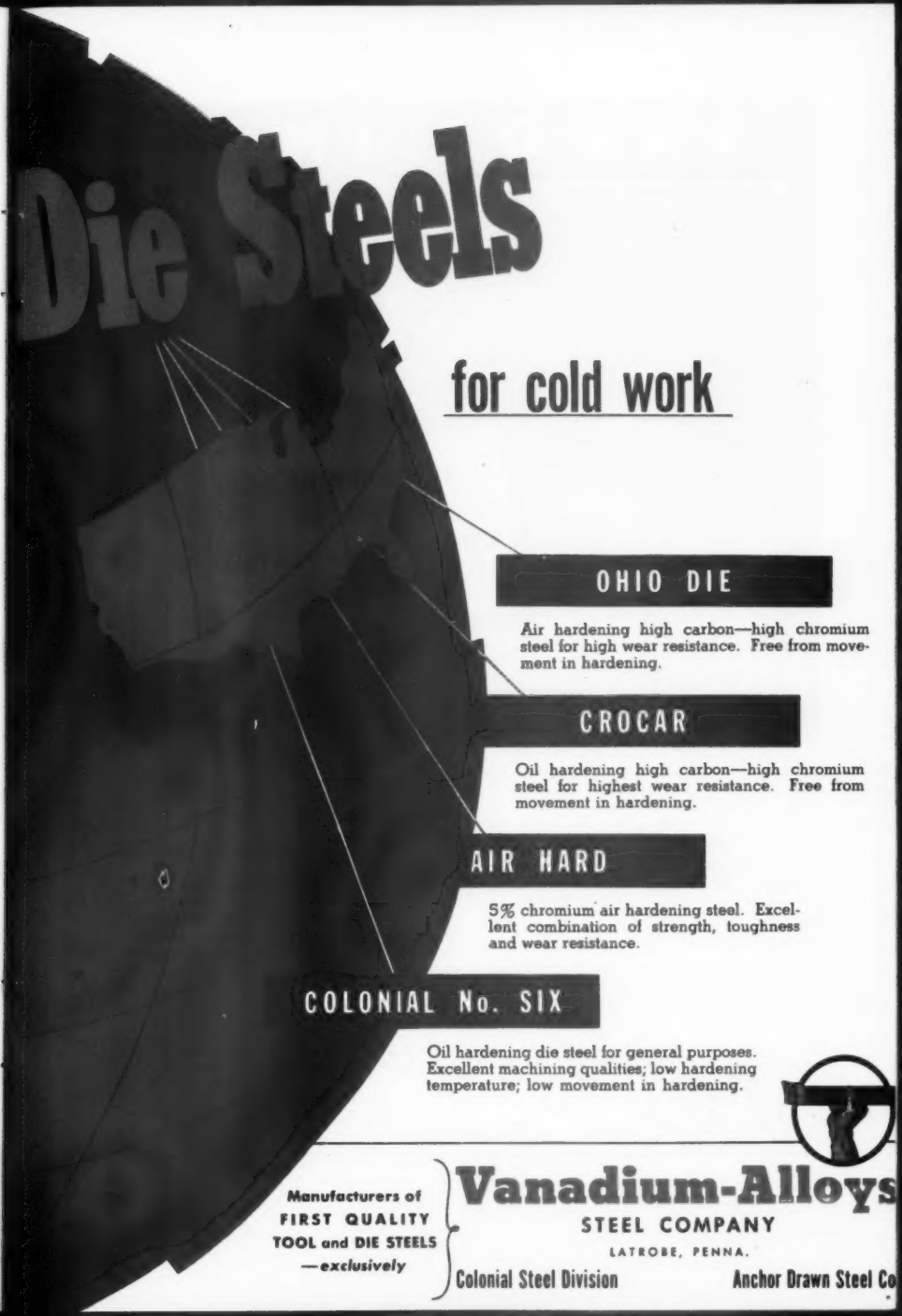
Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1940 ASH STREET, THREE RIVERS, MICH.

Die Steels

for cold work



OHIO DIE

Air hardening high carbon—high chromium steel for high wear resistance. Free from movement in hardening.

CROCAR

Oil hardening high carbon—high chromium steel for highest wear resistance. Free from movement in hardening.

AIR HARD

5% chromium air hardening steel. Excellent combination of strength, toughness and wear resistance.

COLONIAL No. SIX

Oil hardening die steel for general purposes. Excellent machining qualities; low hardening temperature; low movement in hardening.

Manufacturers of
FIRST QUALITY
TOOL and DIE STEELS
—*exclusively*

Vanadium-Alloys
STEEL COMPANY
LATROBE, PENNA.

Colonial Steel Division Anchor Drawn Steel Co

YES, you can save up to 20% on a brand new set of Ellstrom Chromium-plated Gage Blocks simply by trading in your worn set under Ellstrom's liberal exchange plan. Here's how it works . . .

(1) If you have a used set of rectangular Ellstrom blocks, you get a 20% trade-in allowance on a brand new duplicate set.

(2) On worn rectangular blocks of any other make, you get a 10% trade-in allowance.

(3) Used sets of square type blocks bring you a 10% trade-in allowance regardless of make.

(4) Or, if you have any number of individual blocks in need of replacement, the same discounts will be allowed on the price of replacement.

NOTE: All discounts are based on existing W prices.

Under this liberal exchange plan, you can keep your old blocks until we deliver your new ones—each having the inimitable Ellstrom feature of Chromium plated gaging surfaces to assure you of longer wearing millionths!

Write today for latest Ellstrom prices and delivery schedules.

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

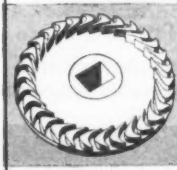
Improve Product AND Productivity

GORTON

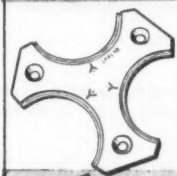
TYPICAL EXAMPLES

OF GORTON MANUAL AND AUTOMATIC *Tracer Control*

High precision production of dies and molds like this injection mold are produced from simple enlarged master patterns without the need of highly skilled operators.



Completely automatic profile milling similar to the profiling of these impeller blades is possible on a standard Gorton with special tooling.



Gorton Tracer Control permits multiple milling, counterboring and engraving operations like the 7 operations performed on this indicator plate from one simple master pattern.

Let us determine for you whether or not Gorton Tracer Control can improve your product and plant productivity. Send us a complete description and prints of one of your jobs. We will furnish a production estimate of the same job tooled on a Gorton—no obligation.

GORTON *Tracer Controlled* MILLING...

is our term for super-speed precision milling, engraving, electrical etching or other metal removal operations where a simple master pattern is used. The increased speed and greater accuracy made possible by this method offer many opportunities for *improving both product and productivity.* Many Gorton users report that their machines paid for themselves in a remarkably short period

1947 MACHINE TOOL SHOW

Come to the Machine Tool Show

Plan now to visit our Booth No. 2 at the Machine Tool Show at the Dodge-Chicago Plant from September 17 to 26 inclusive. Be sure to attend this show—it's the biggest ever held anywhere.

Let Gorton Pre-Determine Results for You

Find out for yourself what Gorton can do for you—before you buy. Make use of Gorton Engineering Service (see Engineering Service offer at lower left). Also, mail us the coupon below and get your free copy of Bulletin No. 1655, containing information on the complete line of Gorton Tracer Controlled Machines.

PLEASE SEND WITHOUT OBLIGATION
Bulletin No. 1655-1207-13

Name.....

Company.....

Position.....

Address.....

City.....Zone....State.....

GEORGE GORTON MACHINE CO.

4-AA *Tracer Controlled Milling*

1207 13TH STREET • RACINE, WISCONSIN, U. S. A.

MELIN TOOLS ARE Unexcelled

FOR MOLD AND DIE MAKING

Hog and finish with a Melin High Speed Long Life 3-Flute bottom cutting end mill. Save time and money.

Order a Melin 3-Flute mill today and check its outstanding performance.

Stock sizes 3/32" to 2", single or double ends, square radius or ball ends. Quick delivery on specials.

Unexcelled

OTHER MELIN TOOLS FOR MOLD AND DIE MAKING

2-flute

4-flute

Deep Cavity

Die Sinking Cutter

Corner Rounding Tool

Counterbore

Countersink

OVER 600 ITEMS
immediately available from stock.

Write today for our new catalog listing over 600 tools, all immediately available for shipment from *stock*.

All Melin cutting tools are High Speed Tools triple drawn for extra long life. They give you:

1. **Extra sturdiness.**
2. **More efficient chip disposal.**
3. **Chatterless operation.**
4. **Minimum spindle strain.**
5. **Stronger, keener, longer lived cutting edges.**
6. **Faster, cleaner cutting with minimum heat generation.**
7. **Positive uniformity.**
8. **Guaranteed concentricity.**

And Now From MELIN You Can Get Ferriot Powermax Air Tools And Rotary Files

Powermax Air Tools give "pencil-free" flexibility, responding equally to a feather touch at a few hundred rpm or a "hogging" cut at maximum power and speed of 15,000 rpm.

Powermax Rotary Files outlast ordinary files 5 to 20 times. Ground from a solid Cast Alloy which has a red-hardness far beyond the range of the best high-speed steel, they assure uniformity . . . with distortion and decarburization completely eliminated.

Available in 36 standard shapes including 285 sizes. Specials will be made to your individual requirements.

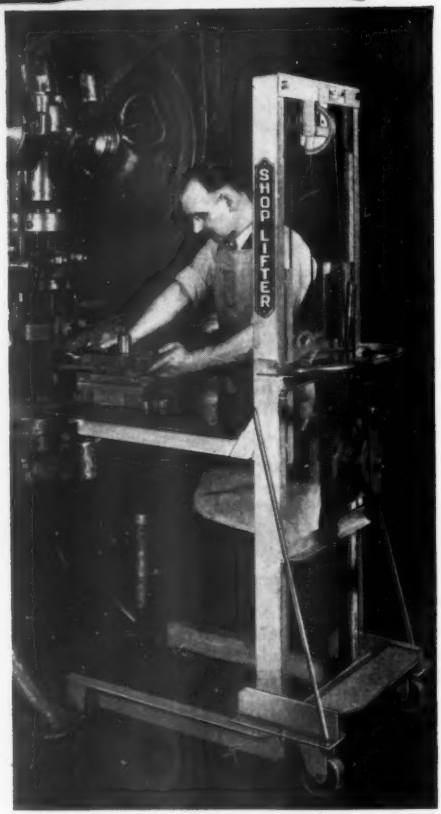
Write us today for literature or ask us for a demonstration of Powermax Air Tools and Rotary Files in your own shop.

For Burring • Grinding • Polishing • Buffing • Drilling • Milling • Routing • Carving • Mixing.

MELIN TOOL COMPANY, INC.
3370 WEST 140th ST • CLEVELAND 11, OHIO
1331 Phillips, S. W., Grand Rapids 7, Michigan

cut production costs with a SHOPLIFTER

- **Light, Compact**
- **Easily Moved About**
- **One-Man Operated**
- **Wide Range in Application**
- **Saves Production Time**
  in handling dies and heavy fixtures; stacking barrels, boxes, etc.; loading and unloading trucks



Specifications

Type—D
Capacity—500 lbs.
Overall height—72"
Platform lift—54" above floor level, lowers to within 5" of floor
Baseframe—24" wide x 33" long
Platform—24" x 24", steel plate
Entire frame of machine of structural steel, electrically arc welded throughout
Basewheels—4" diameter, iron wheels
Crank up and down hoist unit
Two swivel casters and two stationary wheels with push bar furnished
Painted olive green finish
Weight—250 lbs. (approx.)

Heavier capacities up to 5,000 lbs. also available. Write for details.

Prompt Delivery . . . Price $157.50. Full freight allowed

Foot Operated Floor Lock—$10.00 extra

2651 WEST VAN BUREN STREET, CHICAGO 12, ILLINOIS

ECONOMY ENGINEERING CO.

Important ANNOUNCEMENT

THE PIONEERS of tool and die welding electrodes introduce IMPROVED Eureka line

SLAG REMOVAL is easy when you use the improved Eureka tool and die welding electrodes. As shown above, *slag lifts of its own accord* after unit has been "Eureka-welded!" Rapid separation of slag eliminates another age-old weldor's problem!

These improved Eureka mineral coated electrodes may be used for A.C. or D.C. welding. Manipulation characteristics are greatly improved.

Eureka welding can save you many man hours, conserve tools and dies and greatly reduce production delays!

Eureka Welding Equipment & Supply Co.

MEMBER AMERICAN SOCIETY OF TOOL ENGINEERS

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

225 Lolb Street • Detroit 7, Michigan

SIMONDS
ABRASIVE CO.

CENTERLESS GRINDING WHEELS

for Balanced Performance

Proper balance between accuracy of finish and rate of stock removal . . . between fast cutting action and long wheel life . . . plus better balance in the grinding wheel itself . . . these features of Simonds Abrasive Wheels combine to give exceptional results.

Write for copy of our technical manual "Modern Centerless Grinding Practice" for further details. Consult your Simonds Abrasive Distributor for the best grinding wheels for your jobs.

SIMONDS
ABRASIVE CO.
PHILADELPHIA, PA.

SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS
SAW AND STEEL CO.
Fitchburg, Mass.
Saws, Machine Knives, Files

Other Divisions:

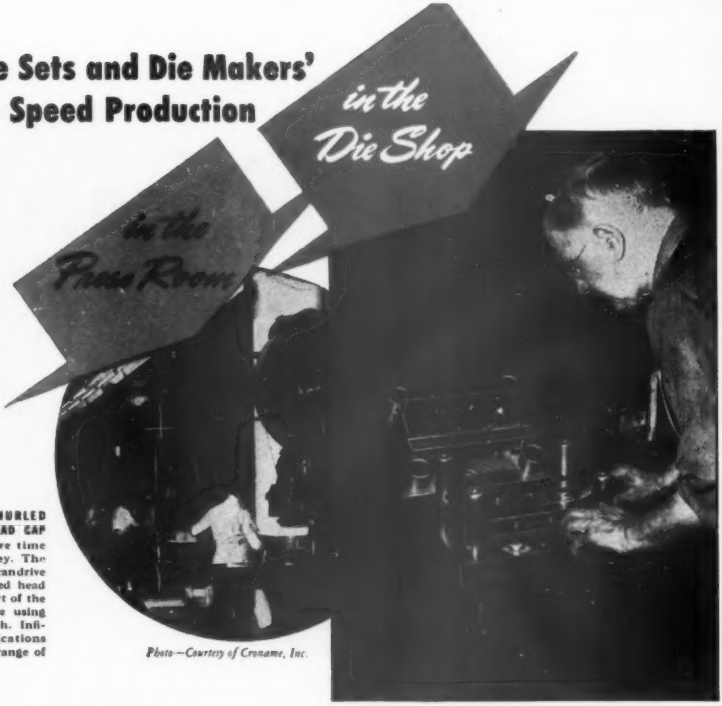
SIMONDS
STEEL MILLS
Lockport, N. Y.
Special Steels

SIMONDS
Montreal, Can.
Simonds Products for Canada

Each Simonds Abrasive Wheel is carefully checked and tested for balance at the factory.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

Danly Die Sets and Die Makers' Supplies Speed Production



Photo—Courtesy of Croname, Inc.

DANLY PRECISION DOWEL PINS are accurate through their entire length . . . Diamond tested for hardness (58-60 Rockwell-C) . . . Ground to a tolerance of .0001".

DANLY KNURLED SOCKET-HEAD CAP SCREWS save time and money. The mechanic can drive the knurled head a good part of the way before using the wrench. Infinite applications—a wide range of sizes.

DANLY KWIK-KLAMP TOGGLE CLAMPS combine strong construction and simplicity of operation—used wherever quick, positive clamping action is required.

DANLY DIE SPRINGS are noted for staying power and high resistance to fatigue. Two complete lines: *Medium Pressure—High Deflection; High Pressure—Medium Deflection.*

DANLY SOCKET-HEAD STRIPPER BOLTS. Made of high-grade steel, these stripper bolts have the same knurled socket-head found in Danly Cap Screws.

DANLY DIE SETS are famed for precision and known accuracy in Die Shops and Stamping Plants everywhere. Many types and sizes in Steel, and Semi-Steel.

DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue • Chicago 50, Illinois

Danly Tool, Die and Gage Makers' Supplies

The One Modern **SHEARING PRESS**

PRODUCTO

No. 2 UTILITY PRESS

50 TON CAPACITY

Just what its name implies . . . the modern, versatile Screw Press . . . for shearing, assembling and lining punches and dies . . . for separating large die sets . . . for short broaching operations, assembling or disassembling press fit components, bearings etc. Also as an arbor and straightening press. Low in cost. High in time and cost-saving value.

PRODUCTO SERVICE IS ALWAYS AT THE PHONE ON YOUR DESK

THE PRODUCTO MACHINE COMPANY
990 Housatonic Ave.,
Bridgeport 1, Conn. Bridgeport 4-9481

NEW YORK 12,
197 Lafayette St.
Worth 4-7484

CLEVELAND 14,
3200 Lakeside Ave.
Prospect 4236

DETROIT 11,
3017 Medbury
Plaza 3101

INDIANAPOLIS 2,
635 Fulton St.
Lincoln 5385

LOS ANGELES 21,
2168 E. Olympic Blvd.
Trinity 9827

MANUFACTURERS OF PRODUCTO DIE SETS

Once-slow, costly radial relief grinding is now fast and inexpensive. Without special skill, any good grinder hand can now relieve a wide variety of tools including those shown at the right, giving you the benefit of faster, better cutting. Radii can be brought up to the cutting edge. Sharp corners can be produced without undercutting. Any width land can be left on diameters following the true spiral of the flute.

Write for literature, prices and the complete story on the D-S Grinder

D-S Grinder Division

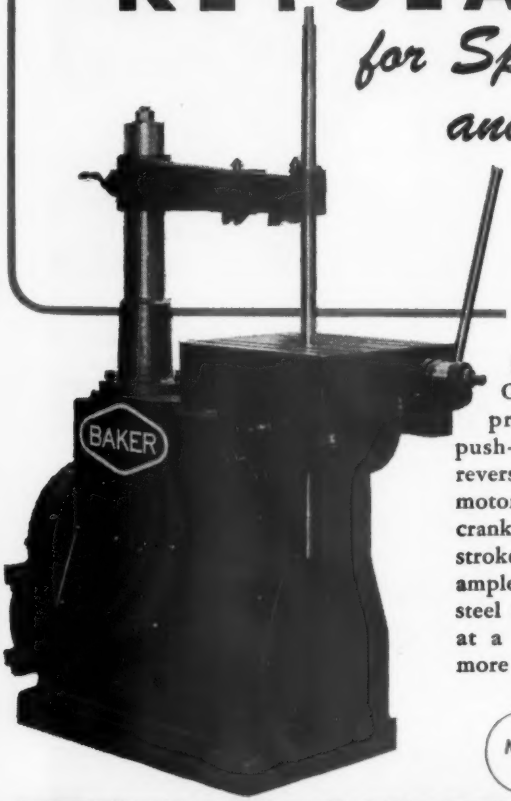
ROYAL OAK TOOL & MACHINE CO.

621 E. FOURTH ST., ROYAL OAK, MICH.

BAKER

KEYSEATER

for Speed and Accuracy



Baker Model O Keyseater meets demands for speed, accuracy and alignment in the finished Keyseat. Soundly designed . . . sturdily built for trouble-free, long-life performance. Operated on the draw cut principle: equipped with a push-button controlled, non-reversing type, 2 HP, 1200 RPM motor, mounted on a pivoted base; crank action adjustable for setting stroke from 0 to 9″. Capacity ample to cut Keyways in mild steel up to 9″ long by 1″ wide at a feed of .005″. Write for more details.

See us at
MACHINE TOOL SHOW
Chicago—Sept. 17-26
BOOTH 639

BAKER BROTHERS, Inc. TOLEDO OHIO

DRILLING . . . TAPPING . . . KEYSEATING . . . CONTOUR GRINDING MACHINES

Tool Maintenance Costs Come Down...

WHEN YOU USE A

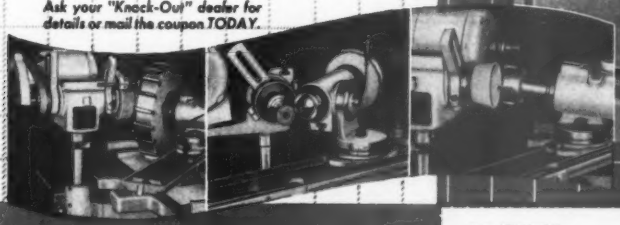
"KNOCK-OUT"

Universal Cutter Grinder

Tool Maintenance Costs Come Down when you use a "Knock-Out" Universal Cutter Grinder.

Set-ups are simpler, easier to make—less time is lost between jobs—more tools of all types can be properly reconditioned at less cost with a "Knock-Out" Universal Cutter Grinder. Handles internal, external and surface grinding too. A "Knock-Out" Universal Cutter Grinder is the busiest machine in any Tool Room.

Ask your "Knock-Out" dealer for details or mail the coupon TODAY.



K. O. LEE CO.

ABERDEEN, SO. DAK.

MANUFACTURERS OF AIRCRAFT TOOLS AND AUTOMOTIVE MAINTENANCE EQUIPMENT

K. O. LEE COMPANY 7
1110 First Ave. S. E., Aberdeen, S. D.
Please send us complete details on "Knock-Out" Universal Cutter Grinders.

NAME_____

ADDRESS_____

CITY_____ STATE_____

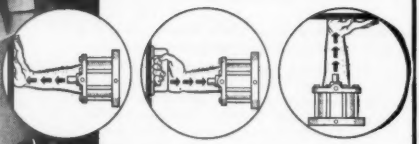
SAVE LABOR

with

T-J CYLINDERS

★ SIMPLIFY MACHINES
★ SAVE OPERATIONS
★ DO PUSH-PULL-LIFT JOBS

Automatically!



More and more today—industry is *saving labor* by applying T-J Air and Hydraulic Cylinders to operations of all kinds where pushing, pulling, lifting or mechanical control is needed. Available in many standard sizes and styles... 100 lb. or 50,000 lb.... both cushioned and non-cushioned types. Backed by 30 years of know-how...T-J engineered to do the job *better* and *cut costs!* Write today for catalogs.

The Tomkins-Johnson Company, Jackson, Mich.

FOR TOUGH JOBS SPECIFY

T-J

TOMKINS-JOHNSON

RIVETORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

MEMO

Tom— I think the RUSNOK has every feature we need for our milling requirements. Let's write for their free illustrated circular. J.D.P.

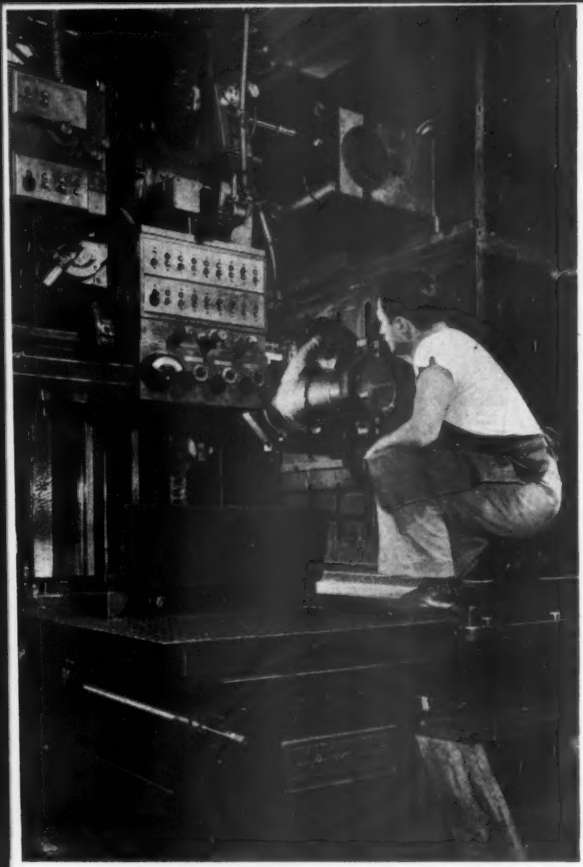
- Precision built for the heavier duty operations
- Heavy duty — easily handles maximum capacity—1/16"—¾" end mills
- Six speeds—six splined pulley drive—timken tapered roller bearings
- Brackets to fit most milling machines—adaptable to many other types of machines
- Utilizes an unlimited variety of cutters
- For vertical, horizontal and angular operations
- 4" quill travel—#9 B & S spindle taper

Write for illustrated circular ***prompt delivery***

HEAVY DUTY **RUSNOK** ATTACHMENT

MILLING • DRILLING • BORING

RUSNOK TOOL WORKS • 4840 W. NORTH AVENUE • CHICAGO 39, ILL.



KELLER WORK

Dies for Tomorrow's Products are being built Today . . . . at Star

For years, Star Machine and Tool has designed and built dies, jigs, fixtures, gages and special machinery to produce "tomorrow's" products — products large and small.

Star is proud to have tooled for years many of the leading manufacturing and production plants in the nation. Star is completely equipped with the most modern machine tools to build your dies, jigs and fixture requirements, as well as your special machinery.

Write us today and include blueprints for a prompt quotation and dependable delivery schedule.

Custom Tool and Die Makers

DESIGNERS AND MANUFACTURERS
OF DIES • JIGS • FIXTURES • GAGES
SPECIAL MACHINERY

Phone GArfield 2060

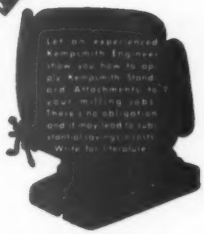
Founded in 1902

STAR ★
MACHINE & TOOL COMPANY

9320 Woodland Ave • Cleveland 4, Ohio

8 Quick Moves
TO LOWER MILLING COSTS

Jump at the opportunity to reduce your milling costs by utilizing Kempsmith standard attachments. These precision-built tools make it possible for you to convert your standard milling machine into a special purpose miller, thereby reducing costs to rock bottom. Kempsmith Attachments, Arbors and Accessories have long proven their ability to handle both delicate tool room jobs and fast production runs. They have the same high degree of precision workmanship and accuracy characteristic of Kempsmith machines for more than 57 years. It will pay you to investigate.


Let an experienced Kempsmith Engineer show you how to apply Kempsmith Standard Attachments to your milling jobs. There's no obligation and it may lead to substantial economies. Write for literature

THE KEMPSMITH MACHINE COMPANY, MILWAUKEE 14, WIS., U. S. A.

KEMPSMITH *Attachments and Arbors!*

Precision Built · Milling · Machines Since 1888

A 1076-1P

Wherever You Are Located . . .
Whatever Your Industry . . . for

Precision Right
METAL
Stamping
Forming
DIES

Check **BUNELL** *First*

4273

You'll find that BUNELL jobs, whether they be units of one ounce or 20 tons in weight, will be PRECISION RIGHT always.

Check **BUNELL** *First*

You'll find a group of expert designers, craftsmen and technicians who thoroughly know their job . . . men who can properly weigh your problem, give you expert opinions and follow through to see that your job is PRECISION RIGHT!

THE BUNELL MACHINE and TOOL COMPANY

1601 EAST 23rd STREET • CLEVELAND 14, OHIO

4273

HAVE YOU HEARD?

Have you heard the reasons why so many people are going to the Machine Tool Show, at the Dodge-Chicago Plant from September 17th to the 26th?

More than 100,000 management, production, engineering, purchasing and financial executives will attend this first Machine Tool Show to be held in twelve years.

It's the World's Greatest Metalworking Show. It's being held in the largest manufacturing plant, under one roof, in the world.

There will be nightly sessions at which papers, covering the latest developments in metalworking techniques and processes, will be presented by world-renowned authorities.

Don't miss this opportunity to see 12 acres of cost-reducing equipment of the future—in full operation. Send in your advance registration now. You'll avoid delay at the registration desk. If you don't have an advance registration form, write for one today. National Machine Tool Builders' Association, 10525 Carnegie Avenue, Cleveland 6, Ohio.

BETTER MACHINE TOOLS
HIGHER PRODUCTION

M T

HIGHER STANDARD OF LIVING

MACHINE TOOL SHOW

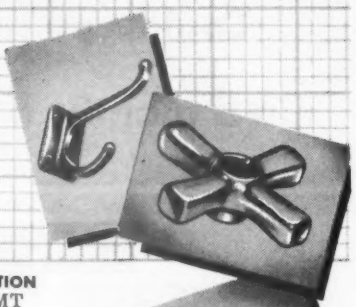
DODGE-CHICAGO PLANT • CHICAGO, ILL.

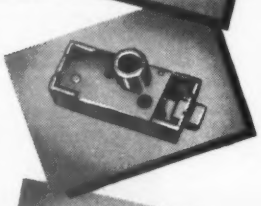
September 17-26 Inclusive

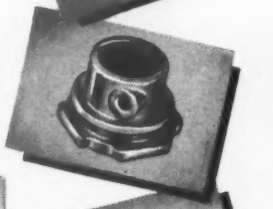
Die Cast Your Small Parts with

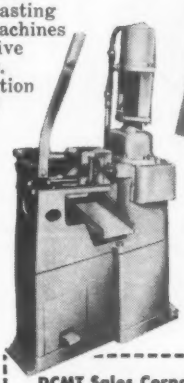
DCMT

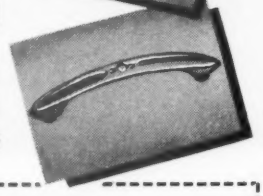
DIE CASTING MACHINES











RAW INGOT TO FINISHED PRODUCT IN ONE OPERATION Your small metal parts can be produced on a DCMT Die Casting Machine – quickly and economically. Manufacturers now using DCMT Machines have eliminated up to 35 machining operations on a single casting – at the same time increasing production 500 per cent. You too can enjoy similar competitive advantages.

INEXPENSIVE DIES By eliminating expensive machinery, DCMT brings pressure die casting within reach of all industries. DCMT Machines are simple, low in cost, utilize inexpensive dies produced on pre-fabricated die sets. Single machine easily maintains production rate of 25,000 shots per week. Standard models cast zinc-, aluminum-, tin- and lead-based alloys.

INVESTIGATE NOW! Hundreds of manufacturers already are using DCMT Machines to meet competitive market conditions. *Investigate this remarkable tool for YOUR plant TODAY. Mail Coupon!*

DCMT Sales Corporation,
Dept. L-7, 315 Broadway,
New York 7, N. Y.

DCMT

DIE CASTING MACHINES

DCMT Sales Corporation, Dept. L-7.
315 Broadway, New York 7, N. Y.

☐ Please arrange for me to see a DCMT Die Casting Machine in actual operation in my locality, without obligation.

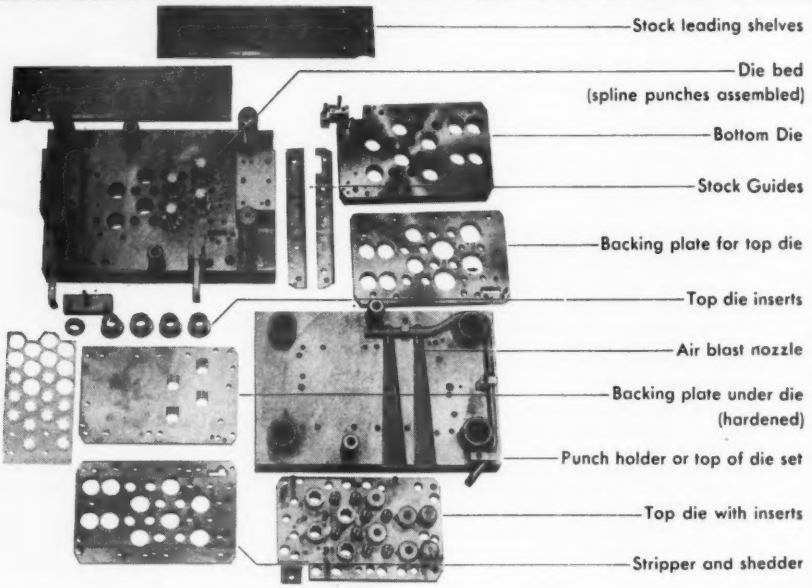
☐ Send copy of your new booklet, *A New Era in Pressure Die Casting.*

Name.....

Address.....

City.....Zone.....State.....

Could you produce 10 of these dies in 5 months by your present methods?



QUADRUPLE DIES PRODUCED INTERCHANGEABLY IN THE MOORE SPECIAL TOOL COMPANY'S TOOLROOM

TAKE A GOOD LOOK at this disassembled quadruple die. Combining compound and progressive features, it produced at every press stroke four fragile splined washers to close dimensions.

Now take another look. *Ten of these dies were made in five months.*

Impossible, you say? Yes, without advanced and accurate hole location methods. To start with, the piece parts would have to be stamped out in one-at-a-time dies instead of quadruple. And since the die parts could only be made progressively, a single die would be a one-man assignment. Add to this, transferring hardening distortion errors through the die into the other plates. At least a

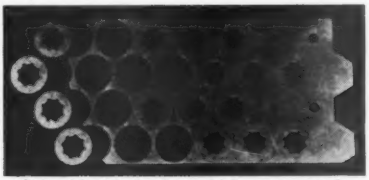
year of uninterrupted production would be required to complete one die.

But this mass-die-production is a triumph of the principle of interchangeable parts-and-assembly applied to toolmaking...made possible by the Moore Jig Borer and the Moore Jig Grinder working as toolroom partners. Accurate hole locations could be attained with speed and ease *only* by jig-boring the holes, applying the Moore lead screw principle of coordinate hole location and, after hardening, finish-grinding them on the only machine of its kind—the Moore Jig Grinder

The first die was produced in three months! All parts were made concurrently to pre-engineered dimensions right down to the dowel holes in the compound-station inserts. And even the detents in the final blanking punches were jig-ground; the detents in the blanking dies were inserted round pieces, set into jig-ground holes.

Complex dies produced and assembled like automobile parts! And you can do the same. *You, too, can work to figures instead of "to fit."* Start on it today by writing for complete literature on the Moore Jig Borer and Moore Jig Grinder.

MOORE SPECIAL TOOL COMPANY, INC.
726 UNION AVENUE, BRIDGEPORT 7, CONN



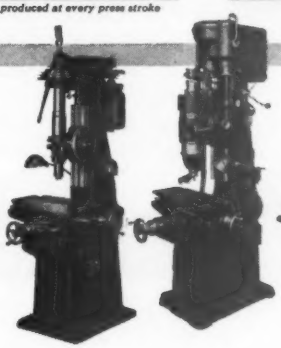
Scrap and four splined washers produced at every press stroke

Here's Interchangeability in Toolmaking

How duplicate die blocks of 10 quadruple dies were produced concurrently for interchangeable assembly. Holes in die block are bored in Moore Jig Borer while equivalent holes in a duplicate die block are ground, after hardening, in Moore Jig Grinder.

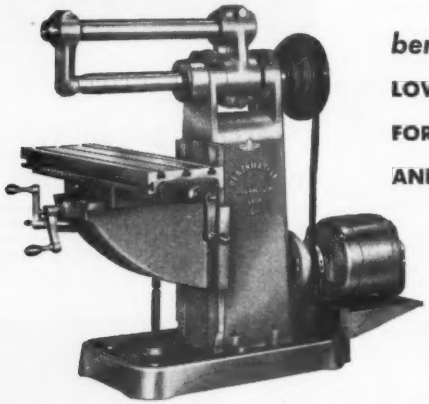
MOORE TOOLS

MOORE JIG BORER



MOORE JIG GRINDER

ONE for TWO jobs



benchmaster OFFERS A LOW-PRICED BENCH MACHINE FOR *BOTH* HORIZONTAL AND VERTICAL MILLING

benchmaster mill with horizontal spindle overarm

SAVES VALUABLE SPACE—CUTS DOWN EQUIPMENT COSTS

Now you can obtain a precision perfect, high-speed *benchmaster* milling machine that's easily convertible from a horizontal to a vertical miller by simply interchanging spindle attachments. Its *un*usual versatility, plus the *usual* quality-plus *benchmaster* workmanship, make this double-duty milling machine an outstanding addition to your shop.

SPECIFICATIONS: Table size—6" x 14"—Three Tee Slots ⅜", 2" center Longitudinal travel 8½"—Traverse travel 5½"—Vertical travel 8½" on vertical mill—9½" horizontal mill—Height 28"—Weight (less motor) 215 lbs.—Requires ⅓ h.p. motor—Spindle speeds (standard 1725 rpm motor) 450-850-1400-2100 rpm.

For complete information, write Dept. TDJ-7

benchmaster MANUFACTURING COMPANY
2952 WEST PICO BOULEVARD
LOS ANGELES 6, CALIFORNIA

benchmaster tools

THIS IS DUPLITROL . . .

. . . FOR MAKING REPETITIVE PARTS *WITHOUT JIGS!*

2 ¾ x ¾ C.R.S. **BARS** **ONE HORIZONTAL ONE VERTICAL** . . . with ¼" holes machined at the desired spacing.

+ **2** **HARDENED** **PINS** . . . used to select locations according to the desired pattern of holes.

+ *Automatic* **POSITIONING** . . . accurately and dependably provides foolproof spacing for machining repetitive parts *without jigs.*

= DUPLITROL by DeVLIEG

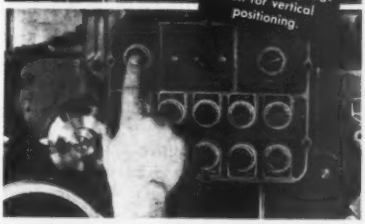
The finest known process for accurately spacing and machining holes.

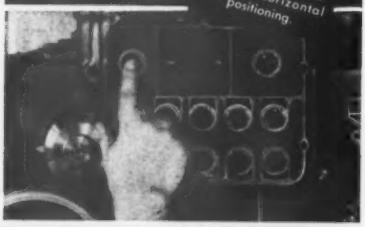
THIS IS HOW IT WORKS . . .

Illustrated at right is one vertical bar and one horizontal bar with pins used as masters on the 3B DeVlieg Duplitrol Equipped Jigmil. Below are illustrations showing how all spacing is done in response to push-button operation.

Push-button operation for vertical positioning.

Push-button operation for horizontal positioning.

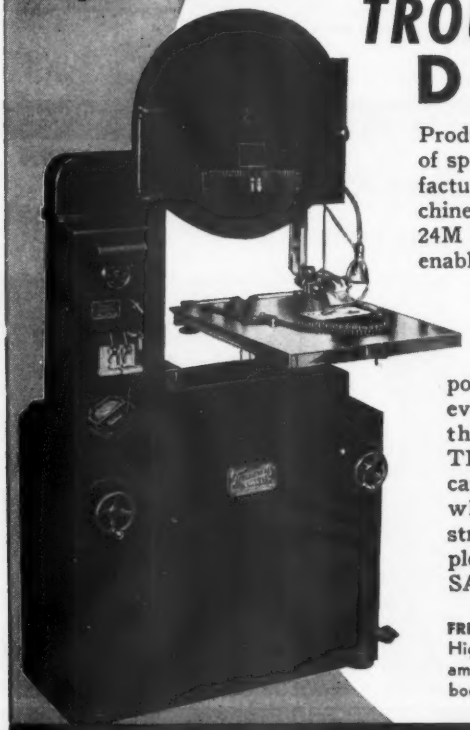




DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL 450 FAIR AVE. FERNDALE 20, (Detroit) MICH.

Tannewitz

The RUGGED-TROUBLE-FREE DI-SAW



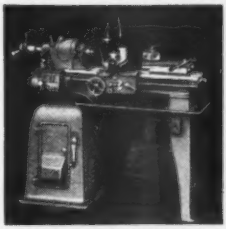
Product of more than 50 years of specialization in the manufacture of band sawing machinery the TANNEWITZ 24M is the machine that will enable you to capitalize to the fullest extent on the economies of contour sawing, inside and outside filing and polishing. It's rugged, with every detail of construction thoroughly proved, — TROUBLE-FREE. And it carries full 24-inch wheels which make for easier, straighter sawing. For complete details write for DI-SAW Bulletin.

FRICTION SAWING with Tannewitz High Speed Band Saws offers many amazing advantages. Write for free booklet.

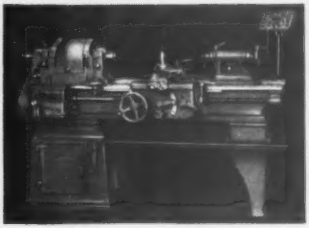
THE TANNEWITZ WORKS
GRAND RAPIDS 4, MICHIGAN

SOUTH BEND *Precision* LATHES

ENGINE LATHES · TOOLROOM LATHES · TURRET LATHES · ATTACHMENTS

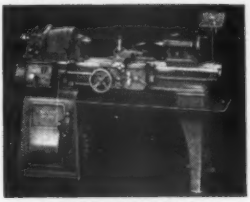


No. 1001-Z SOUTH BEND TURRET LATHE



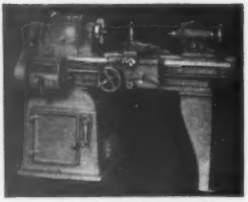
16" x 6' SOUTH BEND TOOLROOM LATHE

10" x 3½' SOUTH BEND TOOLROOM LATHE



13" x 5' SOUTH BEND TOOLROOM LATHE

9" x 3' SOUTH BEND MODEL A BENCH LATHE



14½" x 8' SOUTH BEND ENGINE LATHE

WRITE FOR CATALOG

Illustrates in full color, and gives complete, detailed specifications of all types, sizes, and models of South Bend Precision Lathes; shows all South Bend lathe attachments and accessories. Mailed free on request.

A Size and Type for Every Need

Accurate, versatile, fast, and easy to operate, South Bend Precision Lathes simplify the handling of difficult, close tolerance jobs in all types of laboratory, toolroom, production, and maintenance work. Practical South Bend attachments and accessories increase the scope of these lathes, and speed tooling and production.

South Bend Engine Lathes and Toolroom Lathes are made with 9", 10", 13", 14½", and 16" swings, and bed lengths to 12'. Turret Lathes are made with 9" and 10" swings, and maximum collet capacities to 1".

SOUTH BEND LATHE WORKS

432 E. MADISON ST. • *Lathe Builders Since 1906* • SOUTH BEND 22, IND.

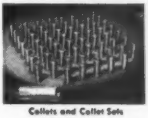
Electric Grinding Attachment

Draw-in Collet Attachment

Draw-in Collet Attachment

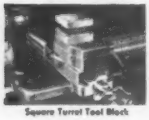
Center and Follower Rests

Telescopic Taper Attachment



Collets and Collet Sets

Handlever Bed Turret

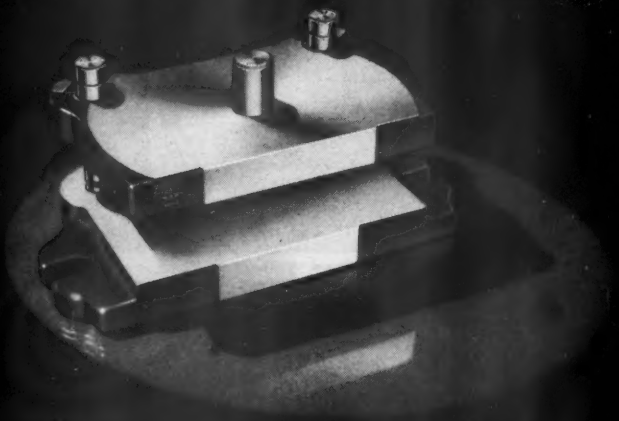


Square Turret Tool Block

Double Tool Cross Slide

Double Tool Cross Slide

Die Sets for Every Stamping Job



Our constant endeavor to deliver a better product is the basis of our ever-increasing volume of business. We invite your inquiries regarding all-steel and semi-steel, standard and special die sets; dowel pins, cap screws, die springs and other accessories.

CALL "DETROIT"

DETROIT	TR 2-5150
INDIANAPOLIS	HU 5604
MINNEAPOLIS	AT 5864
DAYTON	HE 3048
TOLEDO	GA 5706
SEATTLE	SE 2090
PORTLAND, ORE.	AT 1466
SAN FRANCISCO	EX 7018
BUFFALO	PA 9206
PHILADELPHIA	VI 4-4084
ROCK ISLAND, ILL.	RI 743
LOS ANGELES	AD 7251
MILWAUKEE	ED 8359

DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. • DETROIT 2, MICHIGAN

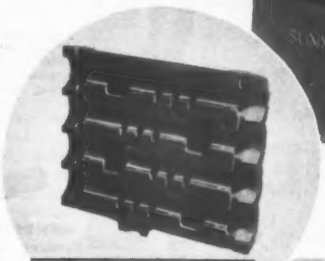
DETROIT DIE SETS ★

SUNNEN PRECISION HONING

Finishes Internal Diameters on Valve Parts Quickly and Accurately--Lengthens Life of Valves

These photographs show typical valves and valve parts on which Sunnen Precision Honing saves time, produces base metal finishes, and straight round holes free of bellmouth and taper. This means that a honed valve can be fit closer, will wear longer and seal better . . . right up to the edge of a port.

The Sunnen Precision Honing Machine is versatile — handles every internal diameter from .120" to 2.625" in any metal, plastic, glass or ceramic material, except lead and babbitt. New sizes are accommodated by small investment in new mandrels.



Straight round holes are produced on this part for Jeffrey Mfg. Co., Columbus, Ohio — in spite of the irregular ports and lands.

Gyroscope balance valve body "saves production time in getting closer limits of accuracy."

The sizing control on the Sunnen Precision Honing Machine permits removing as little as .0001", to produce a perfect fit. Maintains previously established alignment — duplicates sizes easily — requires no jigs or fixtures — can be set up ready to operate in one minute.

Removing .002" of stock from this bronze carburetor valve produces a straight round hole accurate within .0001".

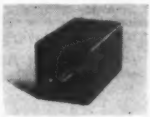
For additional information, write for bulletin XMAN-5000, or ask a Sunnen engineer to show you how Sunnen honing can be used in your plant.

SUNNEN

TRADE MARK REG. U.S. PAT. OFF. - MARCA REGISTRADA

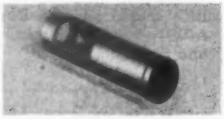
SUNNEN PRODUCTS CO.
7947 Manchester Ave., St. Louis 17, Missouri
Canadian Factory: Chatham, Ontario

Bronze valve. The Sunnen Precision Hone is used to secure high finish and accuracy.



Saved time in producing a smooth accurate finish on this bronze remote control valve body.

Smooth accurate finish is produced on this bronze oil burner valve part with .001" to .002" stock removal.



A minimum of 70% bearing surface is produced on this hardened steel valve guide bushing. Reamer marks are removed — tolerance limits .0003".

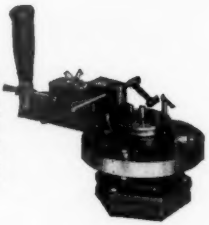
PRECISION CENTERED EYE BENDING

with

DI-ACRO BENDERS

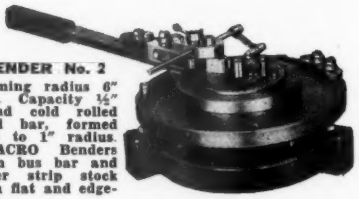
A Centered EYE in 1 Operation

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at a high rate of production. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.



BENDER No. 1

Forming radius 2" app. Capacity 7/32" round cold rolled steel bar or equivalent. All DI-ACRO Benders have two-way action, right or left hand mounting and reversible forming nose.



BENDER No. 2

Forming radius 6" app. Capacity ½" round cold rolled steel bar, formed cold to 1" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edgewise.

BENDER No. 3

Forming radius 9" app. Capacity ½" round cold rolled steel bar, formed cold to 1" radius. Bender No. 3 is especially designed for aircraft, marine and other large radius bending.

DI-ACRO IS PRONOUNCED "DIE-ACK-RO"

DI-ACRO bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, molding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

Send for Catalog "DIE-LESS" DUPLICATING

showing many kinds of "DIE-LESS DUPLICATING" produced with DI-ACRO Benders, Brakes and Shears.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

315 Eighth Ave.
Lake City, Minn.

HEAT TREAT SMALL PARTS

In Your Own Plant

- Install anywhere by simple wire connection. Quiet in operation. No fumes or odors — no ventilating required.
- Any intelligent man can operate furnace with automatic temperature control, using established procedures.
- Operating cost under 4c per hour to hold 1600° F. in Model 3 furnaces, with 2c per kw.-hr. rate. Others in proportion.
- Models 3 and 4 furnaces heat from cold to 1400° F. in 40 min. or to 1850° F. in 55-65 min. Model VK-5 heats to 2000° F. in 2½ hrs. Half this time required after overnight shut-down.

NOW YOU CAN heat treat, harden and temper small parts in your own plant . . . *without experienced heat treaters.* Economical to install and use, Cooley Electric Furnaces operate efficiently at high or low heats, and save your large furnace time for work requiring large volume capacity. Here are some profitable uses:

PRODUCTION HEAT TREATING of small parts . . . Small batches . . . Running pilot lots to predetermine mass production techniques . . . Emergency repairs . . . Industrial and laboratory testing . . . Miscellaneous controlled heating jobs.

PROTECTED, REMOVABLE ELEMENTS

Nickel-chromium resistors are embedded in 4 refractory blocks which form the chamber walls. This reduces chemical deterioration from exposure to air . . . protects elements from physical damage . . . assures uniform heating by maintaining correct coil spacing. Units are quickly removable without dismantling furnace.

CHAMBER	8"W 6"H 14"L				10"W 8"H 18"L				8"W 6"H 14"L
FROM COLD	1850° F. in 55-65 min.				1850° F. in 55-65 min.				2000° F. in 2½ hrs.
AMPERES	14.8 at 230 v.				19.6 at 230 v.				20.2 at 230 v.
WATTS	3400				4500				4650
MODEL*	MH-3	VH-3	MK-3	VK-3	MH-4	VH-4	MK-4	VK-4	VK-5
PRICE	146.00	166.00	186.00	206.00	222.50	242.50	262.50	282.50	340.00

* M models complete with hinged door and hearth plate.
V models have counterweighted vertical lift door with adjustable opening.
K models include Selective Power Modifier for input control to correct temperature lag.

ACCESSORY EQUIPMENT

Electronic operated Veri-Tron indicating and controlling pyrometer, with thermocouple and lead wire $143.00
Same in self-contained, enclosed panel including line switch and fuses, with steel stand—completely wired 240.00
Steel stand with shelf 35.00

DEALERS AND DISTRIBUTORS WANTED!

Good territories open on this extensive line of self-contained small electric furnaces. Investigate now.

FREE HEAT TREATING HELP

Our experience in heat-treating is available to you. State your problem . . . write for free literature today — no obligation.

COOLEY ELECTRIC MANUFACTURING CORP.
32 South Shelby Street Indianapolis 7, Indiana
INDIANAPOLIS MACHINERY EXPORT CORP.
Export Manager, 44 Whitehall Street, New York, New York

BORED CONTOURS AIR-TRACED

for greater accuracy

Molds, dies and similar contour boring jobs are a "natural" for the Monarch Air-Tracer.

With this new lathe attachment you can handle such work faster, for lower cost—and *more accurately*—because the cutting tool motion is stepless. Finish is better, tolerances are closer; the slightest change in template shape is instantly translated into slide feed.

On jobs where accuracy is all-important, this ability to follow contours closely pays off in dollars saved—by increased production, by closer tolerances, by fewer rejects. That's why the Air-Tracer was selected for the lens lap job illustrated; the final lens can be no more accurate than the machine that makes the lap. And the machine's accuracy isn't subject to human errors, either—the Air-Tracer's operation is continuous and automatic.

Whether you're boring or turning contours; machining tapers, step-shafts or ordinary production lathe jobs, the Monarch Air-Tracer can save you time and money. Like more details? Ask for bulletin 2601.

THE MONARCH MACHINE TOOL COMPANY
Sidney, Ohio

PART—Lens Lap; Material—Casting; Cutting Tool—Cemented Carbide. Time Per Piece for Complete Rough and Finish Machining—14.40 Min.

FOR SPEED, ACCURACY AND FINISH, THE MONARCH AIR-TRACER*

1. **Stepless cutting-tool motion provides a superior continuous finish.**
2. **Setup times averaging five to ten minutes permit profitable use for a wide variety of small-lot production jobs.**
3. **Automatic yet versatile operation results in economical, accurate high production.**

Available exclusively on the new Monarch Lathes.

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

WHAT COULD BE SIMPLER FOR

CORNER AND EDGE NOTCHING THAN

WALES NOTCHING UNITS

Showing a Wales Ty "NG" Notching Un equipped with stands side gauges which may adjusted and set accor ing to required notch.

So simple in design and operation, Wales Notching Units require practically no setup time. Just place the Units on a T-slotted plate or Template in a clamping press, or on a Bed Rail of a press brake and *start operating.* That's all there is to it *because* all parts are built into the self-contained holder; the punch and die are in perfect alignment; and nothing is attached to press ram. Wales Notching Units are the ultimate in tooling simplicity.

PUNCHING AND NOTCHING IN SAME SET-UP

Showing a combination s up of Wales Type "N Notching Units and T "BL" Hole Punching Un for notching and punchi in the same operation. S ups may be made in stan ing presses as well as p brakes.

The design of Wales Notching Units also takes into consideration possible use with Wales Hole Punching Units for punching and notching in the same operation. This is just one of the many economies of time and money that are produced with this *versatile* Wales Equipment.

THE SIMPLICITY AND ECONOMIES OF WALES EQUIPMENT IS TOO BIG A STORY TO TELL ON THIS PAGE *SO WRITE FOR FULLY-ILLUSTRATED, FUNCTIONALLY-COLORED CATALOGS TODAY,* DESCRIBING 5 STANDARD TYPES OF NOTCHING UNITS.

WALES-STRIPPIT CORPORATION

George F. Wales, President

355 Payne Ave., N. Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

WALES-STRIPPIT OF CANADA, LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

BORED CONTOURS AIR-TRACED

for greater accuracy

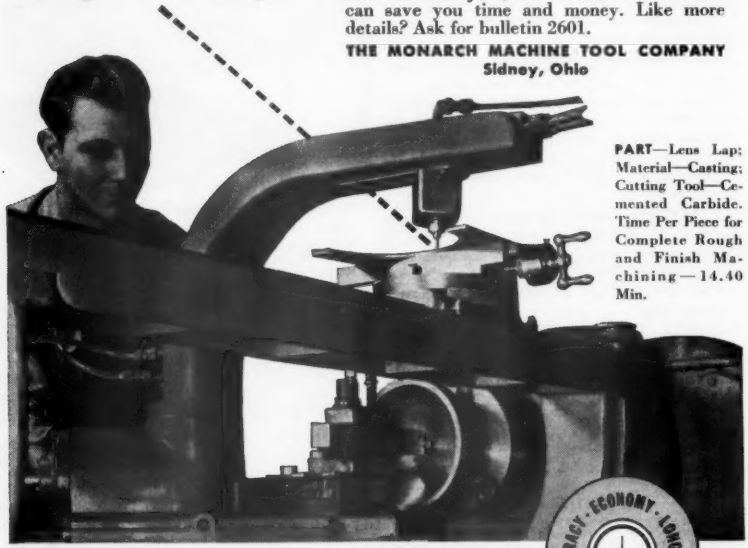
Molds, dies and similar contour boring jobs are a "natural" for the Monarch Air-Tracer.

With this new lathe attachment you can handle such work faster, for lower cost—and *more accurately*—because the cutting tool motion is stepless. Finish is better, tolerances are closer; the slightest change in template shape is instantly translated into slide feed.

On jobs where accuracy is all-important, this ability to follow contours closely pays off in dollars saved—by increased production, by closer tolerances, by fewer rejects. That's why the Air-Tracer was selected for the lens lap job illustrated; the final lens can be no more accurate than the machine that makes the lap. And the machine's accuracy isn't subject to human errors, either—the Air-Tracer's operation is continuous and automatic.

Whether you're boring or turning contours; machining tapers, step-shafts or ordinary production lathe jobs, the Monarch Air-Tracer can save you time and money. Like more details? Ask for bulletin 2601.

THE MONARCH MACHINE TOOL COMPANY
Sidney, Ohio



PART—Lens Lap; Material—Casting; Cutting Tool—Cemented Carbide. Time Per Piece for Complete Rough and Finish Machining—14.40 Min.

FOR SPEED, ACCURACY AND FINISH, THE MONARCH AIR-TRACER*

1. **Stepless cutting-tool motion provides a superior continuous finish.**
2. **Setup times averaging five to ten minutes permit profitable use for a wide variety of small-lot production jobs.**
3. **Automatic yet versatile operation results in economical, accurate high production.**

Available exclusively on the new Monarch Lathes.

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

WHAT COULD BE SIMPLER FOR CORNER AND EDGE NOTCHING THAN

WALES NOTCHING UNITS

Showing a Wales Ty "NG" Notching Un equipped with standa side gauges which may adjusted and set accor ing to required notch.

• So simple in design and operation, Wales Notching Units require practically no setup time. Just place the Units on a T-slotted plate or Template in a stamping press, or on a Bed Rail in a press brake and *start operating.* That's all there is to it *because* all parts are built into the self-contained holder; the punch and die are in perfect alignment; and nothing is attached to press ram. Wales Notching Units are the ultimate in tooling simplicity.

PUNCHING AND NOTCHING IN SAME SET-UP

Showing a combination s up of Wales Type "N Notching Units and Ty "BL" Hole Punching Un for notching and punchi in the same operation. S ups may be made in stan ing presses as well as p brakes.

The design of Wales Notching Units also takes into consideration possible use with Wales Hole Punching Units for punching and notching in the same operation. This is just one of the many economies of time and money that are produced with this *versatile* Wales Equipment.

THE SIMPLICITY AND ECONOMIES OF WALES EQUIPMENT IS TOO BIG A STORY TO TELL ON THIS PAGE *SO WRITE FOR FULLY-ILLUSTRATED, FUNCTIONALLY-COLORED CATALOGS TODAY,* DESCRIBING 5 STANDARD TYPES OF NOTCHING UNITS.

WALES-STRIPPIT CORPORATION

George F. Wales, President

355 Payne Ave., N. Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

WALES-STRIPPIT OF CANADA, LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

Specify MO-MAX HIGH SPEED STEELS

In circular and flat forming tools, as in all other cutting tools, the toughness and hardness of MO-MAX assure better performance.

Buyer's Guide to Brands of MO-MAX

"LMW"	Allegheny Ludlum Steel Corporation
"MOHICAN"	Atlas Steels Limited
"BETHLEHEM MM"	Bethlehem Steel Company
"MO-CUT"	Brashears Alloy Steel Corporation
"STAR MAX"	Carpenter Steel Company
"ISOLITE M-T"	Columbia Tool Steel Company
"REX T-MO"	Crucible Steel Company of America
"DI-MOL"	Henry Disston & Sons, Inc.
"FI-MO"	Firth-Sterling Steel Company
"REX T-MO"	Halcomb Steel Company
"MOGUL"	Jessop Steel Company
"TATMO"	Latrobe Electric Steel Company
"MIDMAX"	The Midvale Company
"S. T. M."	Simonds Saw & Steel Company
"MO-TUNG"	Universal-Cyclops Steel Corporation
"V-N-2"	Vanadium-Alloys Steel Company
"VUL-MO"	Vulcan Crucible Steel Company

Only MO-MAX GIVES YOU ALL THESE ADVANTAGES

1. MO-MAX has superior cutting qualities.
2. The machinability of MO-MAX is unexcelled.
3. MO-MAX is economical. Its specific gravity is about 8% less than that of 18% tungsten steel.
4. MO-MAX is available in a standardized composition; also in cobalt and high vanadium varieties for special high speed steel requirements.
5. For 14 years MO-MAX has demonstrated its superiority in all types of cutting tools.

Learn all the facts! **Send for your copy of the MO-MAX Handbook, sixth edition. Get the full story about this remarkable steel, including easy-to-follow instructions on heat treating.**

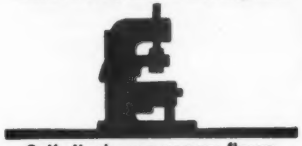
THE CLEVELAND TWIST DRILL COMPANY

1260 East 49th St. • Cleveland 14, Ohio

Empco JACKS

Set and *KEEP* Your Machines LEVEL!

Saves set-up and re-leveling time



Self aligning on uneven floors

Accurate two-way adjustment

Machine Tool Manufacturers strongly emphasize the need, not only to set machines level, but to keep 'em that way. Periodic re-leveling is essential for accurate work tolerances. How often, depends on the type of foundation. No method of machine setting is stable enough to maintain the accuracy of initial leveling. It is important to check after first month of operation, then check periodically and re-level whenever necessary.

When a machine is set on EMPCO JACKS, the whole operation is the work of but a moment: Simply apply a wrench to the "hex" screw head, turn right or left until your level indicator reads "zero."

3 SIZES

No. 1—2" normal height
No. 2—2⅜" normal height
No. 3—3⅛" normal height

EMPCO

THE ENTERPRISE MACHINE PARTS CORPORATION

2735 JEROME AVE. DETROIT 12, MICH.

SPRINGFIELD PRECISION TOOL ROOM LATHE

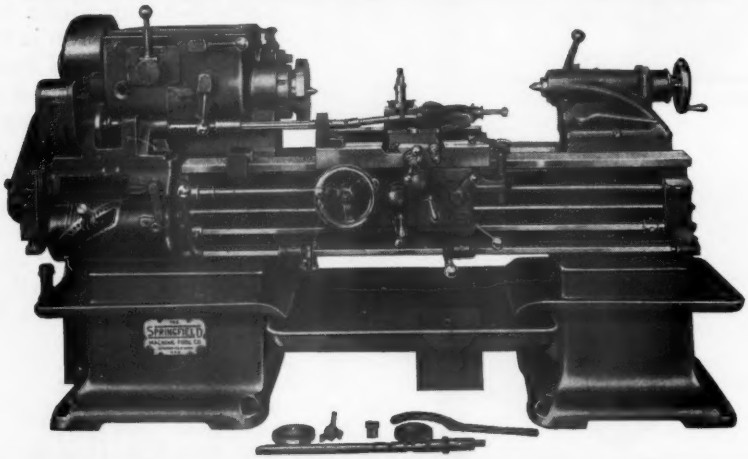
"A Master Lathe for Master Craftsmen"

The Springfield Precision Tool Room Lathe is engineered and constructed to the most exacting requirements. Its superior design features have been developed through more than sixty years' experience in building precision machine tools.

The powerful Headstock provides twelve spindle speeds. No more than seven of its chrome Molybdenum hardened *ground* gears are in mesh at one time. Timken Precision Taper Roller Bearings in solid headstock housings insure permanency of spindle alignment and long life. All bearings and gears are spray lubricated by cooled oil from the large reservoir in the leg.

The semi-steel Apron is of extra-heavy, box construction and is completely ball and bronze bearing-equipped. The Taper Attachment is capable of very fine, micrometer screw adjustment. The sturdy Compound Rest is a heavy duty, square base type providing full 360° swivel. The Tailstock, massively designed, has large centers and exceptionally long spindle travel.

ASK US FOR *YOUR* COPY OF BULLETIN 162 which illustrates and describes the features of the Springfield Precision Tool Room Lathe and gives detailed specifications.



THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD • OHIO U. S. A.

Interchangeable

A. S. A. STANDARD

PRECISION DRILL JIG BUSHINGS

Speed Up Drilling—Cut Down Costs!

PROMPT DELIVERY of all A.S.A. standards direct from factory stocks at Garwood, N. J. • Stocks of all popular types and sizes maintained at Dayton, Detroit and Stratford • FREE color Catalog No. 446 gives standard bushing sizes, together with price list and other information needed by the tool engineer • Write for it Today.

ABC TRADE MARK

ACCURATE BUSHING CO.

441 North Ave., GARWOOD, N. J. • WEstfield 2-2415

REPRESENTATIVES

RICHMOND, VA.
N. B. Shriner
Richmond 7-7290

BOSTON, MASS.
M. A. Siebert Co.
Garrison 0104

LOS ANGELES, CALIF.
Walter W. Miller
PRospect 2687

PHILADELPHIA, PA.
Albert R. Dorn
DElaware 6-3553

NEW YORK, N. Y.
Carlton Eberhard
Wisconsin 7-9193

PITTSBURGH, PA.
The Commonwealth Sales Co.
Grant 1362

ORLANDO, FLA.
Charles W. Bringman
Telephone 2-3747

CHICAGO, ILL.
Prescott Production Tool Co.
ARmitage 3364

*DAYTON, OHIO
Geo. D. Laughter Co.
KEnmore 4191

*DETROIT, MICH.
Booth & Shaw
TEmple 1-4040

HOUSTON, TEXAS
Chickering Tool & Eqp't. Co.
W-6—8584

ST. LOUIS, MO.
L. P. Schlicher
Main 0150

DAVENPORT, IOWA
Davenport Engineering Corp.
DAvenport 2-1791

*STRATFORD, CONN.
Ellsworth Steel & Supply Co.
BRidgeport 7-3317

MINNEAPOLIS 2, MINN.
Chas. W. Stone Co.
Geneva 8631

ROCHESTER, N. Y.
Fink Tool Co.
Monroe 5679

MILWAUKEE 3, WIS.
The Stone Company, Inc.
Broadway 2452

INDIANAPOLIS, IND.
General Supply & Tool Corp.
Lincoln 8353

Stock of popular sizes carried at these locations.

another job
DONE RIGHT

with an ARMOUR abrasive specialty

WHATEVER YOUR PRODUCTS OR SPECIALIZED NEEDS...one of Armour's complete line of better metal-working abrasives is *right for you!*

ARMOUR *Sandpaper* WORKS

Division of Armour and Company

1355 West 31st Street, Chicago 9, Illinois

RACINE HYDRAULICS

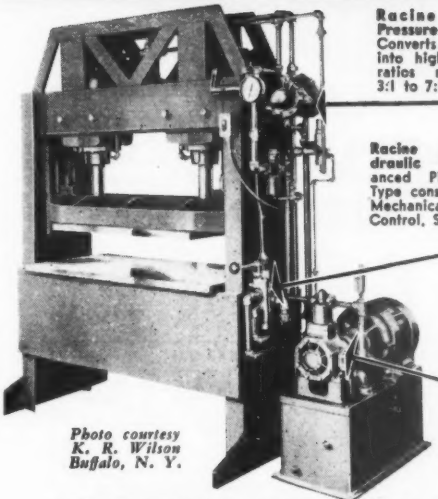
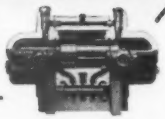
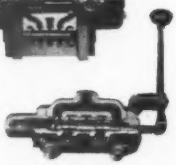


Photo courtesy K. R. Wilson Buffalo, N. Y.

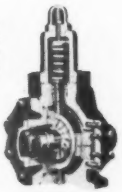
Racine Hydraulic Pressure Booster — Converts low pressures into high pressures in ratios ranging from 3:1 to 7:1.



Racine Four-Way Hydraulic Valve — Balanced Piston — Sleeve Type construction. Manual, Mechanical and Electrical Control. Sizes ⅜" to 1½".



Racine Variable Volume Oil Hydraulic Pump — 12 to 30 G.P.M. Pressure 50 to 1000 lbs. p.s.i.



INTEGRATED TO YOUR DESIGN . . .
centralized or remote control

Like this press manufacturer, you can readily give your products the advantage of a RACINE "Variable Volume", hydraulic circuit. This feature saves horsepower and reduces heat by simplifying the installation and eliminating unnecessary relief and bypass valves. Important savings in first cost also result.

RACINE Hydraulic Engineers have developed hydraulic operation and control for hundreds of machines and tools. Their experience can be helpful in applying "RACINE Hydraulics" to your present product and on new designs now in the development stage. They will cheerfully review your problems in power movement, without cost or obligation.

Let us submit detailed recommendations and circuits employing pressures as high as 3000 lbs. p.s.i. Utilize the Variable Volume feature of RACINE Pumps and easy operating, long-lived RACINE sleeve-type valves. Ask for RACINE catalog P-10-C today. RACINE TOOL AND MACHINE COMPANY, 1778 State St., Racine, Wisconsin.

RACINE

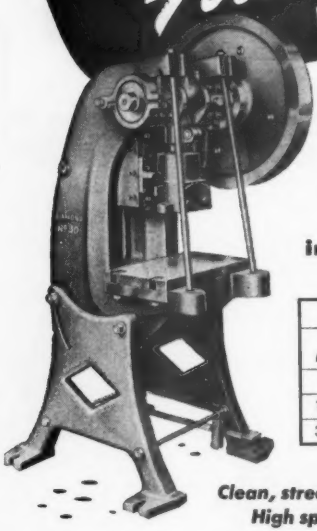
STANDARD FOR QUALITY AND PRECISION

First Choice FROM ALL ANGLES

...design
...workmanship
...performance

Diamond OPEN-BACK INCLINABLE PUNCH PRESSES

in 9 14 30 Ton Ratings



QUICK SPECIFICATIONS				
Model	Standard Stroke*	Shut Die Height	Bed Area	Flywheel Speed
9 Ton	1½"	7"	6½"x12"	185 max.
14 Ton	2"	9"	8"x15"	150 max.
30 Ton	3"	9"	13"x22"	125 max.

* Longer strokes available upon special order.

Clean, streamlined appearance • Careful craftsmanship
High speed performance • Safe, easy operation

DIAMOND PUNCH PRESSES are among America's *finest* machine tools...Sleek and trim, yet designed for amazing strength. High overload capacity. Smoothly finished and accurately fitted in every detail. Production tolerances so close that parts are uniformly interchangeable!

If you want to punch holes in your production quotas, see these improved Diamond Punch Presses! Available from dealers throughout the nation. Write for FREE circulars!

FEATURES

CRANKSHAFT—Chrome nickel steel—precision ground all over. Bearing surfaces finished to 20 micro-inches.

RAM—Bearing surfaces precision jig-ground, hand scraped for individual fit. Exclusive floating-type fully universal ball screw and nut maintains close alignment over full ram stroke.

GIBS—Precision sliding surfaces ground to 20 micro-inches.

CLUTCH—Positive, instantaneous contact with three sets of pins engaging flywheel.

FLYWHEEL—Extra heavy for smooth operation and maximum energy. Mounted on oversize bronze bushing.

FRAME—Massively constructed semi-steel castings, correctly designed for high overload protection.

DIAMOND MACHINE TOOL CO.

Dept. G • 3429 E. Olympic Blvd. • Los Angeles 23, Calif.

DIAMOND DTCo

MANUFACTURERS of the DIAMOND LINE of PRECISION MACHINE TOOLS and ACCESSORIES

YOU GET PEAK PERFORMANCE

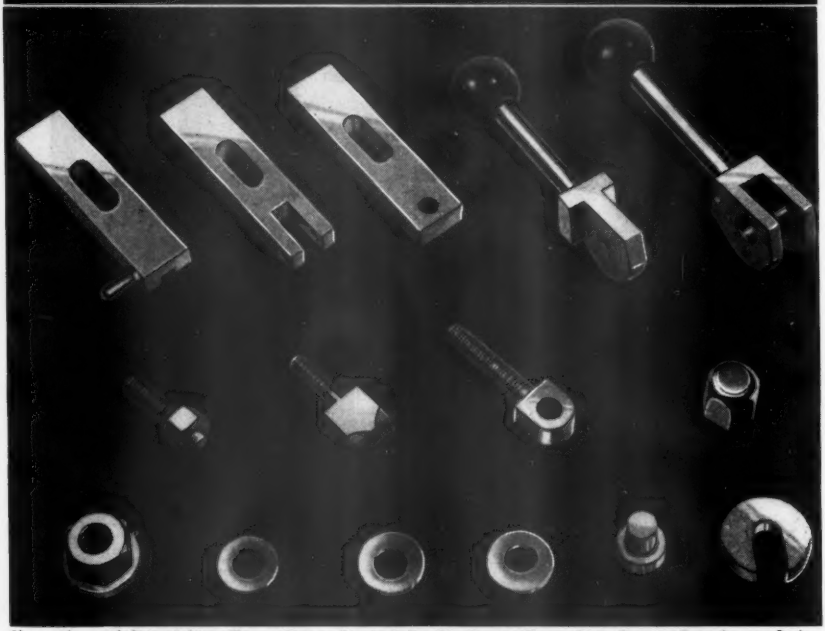
WHEN YOU *Specify*

XLO DRILL JIG BUSHINGS

For years Ex-Cell-O has been known by American industry as headquarters for precision-made bushings . . . Ex-Cell-O carries one of the largest and most varied stocks of drill jig bushings available in the world. Stocks are carried in Detroit, New York and Los Angeles.

EX-CELL-O CORPORATION • DETROIT 6, MICHIGAN

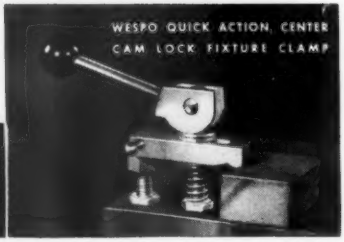
DESIGN YOUR FIXTURES WITH WESPO *IMPROVED* FIXTURE PARTS AND FITTINGS



Shown in cut left to right — Clamp Straps, Single & Double Cams, Clamp Rest, Quarter Turn Screw, Swing Bolt, Acorn Nut, Flange Nut, Plain Washer, Spherical Washers, Rest Button, C Washer.

SAVE IN DESIGNING AND MACHINING—Standardize on adaptable WESPO Parts and Fittings. Cost less, due to quantity production. Attractive discounts on quantity orders. Wide variety of sizes to fit your tooling program. Used by leading manufacturers throughout the U.S.A. Full scale Template Sheets and prices on request. **IMMEDIATE DELIVERY.**

Also a complete line of Quick Action and Hand Operated Fixture Clamps. Full Scale Template Sheets available. Write for Bulletin.



WEST POINT MFG. CO.
19625 MERRIMAN COURT
FARMINGTON, MICHIGAN

WHITTLE IT?

NO, BUT YOU CAN ECONOMICALLY—

ROUT
MILL
CUT
TAP
TURN
DRILL
SHAPE

You'll profit most when you use Masonite* Die Stock to quickly produce dies, jigs, fixtures and other tools. This dense, durable material weighs one-sixth as much as steel—machines easily with wood- or metal-working tools. It's ideal for fabricating thin-gauge sheet metals. Won't shrink or twist. Speeds preparation for production runs—cuts costs on experimental tooling, mock-ups and models. It will pay you to find out more about this versatile material.

*"Masonite" is a trade-mark registered in the U.S. Pat. Off., and signifies that Masonite Corporation is the source of the product.

with MASONITE Die Stock!

MAIL THIS COUPON

TODAY
FOR COMPLETE DETAILS

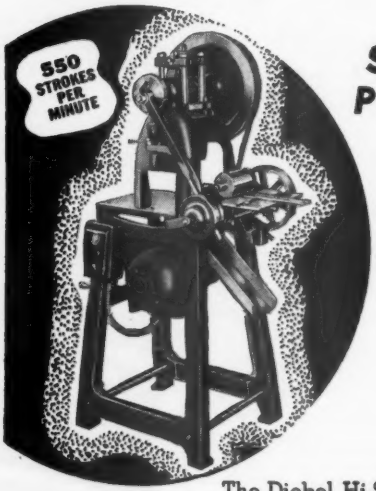
MASONITE CORPORATION · 111 W. WASHINGTON ST. · CHICAGO 2, ILL.
Masonite BRAND DIE STOCK FOR TOOLING

MASONITE CORPORATION, Dept. TD-7, 111 W. Washington St. Chicago 2, Illinois
Please send me illustrative book, "Masonite Die Stock Data Book."

Name.....
Firm and title.....
Address.....
City.....*Zone*.....*State*.....

DIEBEL

Hi 550 R.P.M. Speed AUTOMATIC PRESS



STEPS UP PRODUCTION

CUTS COSTS

on all Small Stampings

METAL
PLASTIC
FIBRE
PAPER
RUBBER
LEATHER

The Diebel Hi-Speed Punch Press requires less floor space—less power—increases production—is safer—releases heavier presses for other production.

Remember—this versatile Hi-Speed Automatic Press is adjustable up to 550 strokes per minute!

WRITE TODAY FOR ILLUSTRATED LITERATURE

DI MACHINE CORP.
DIVISION OF DIEBEL DIE & MFG. CO.
2708 West Irving Park Road Chicago 18, Illinois

★4 BIG REASONS WHY

the Standard COULTER "HT" Thread Milling Machine IS THE MACHINE FOR YOU!

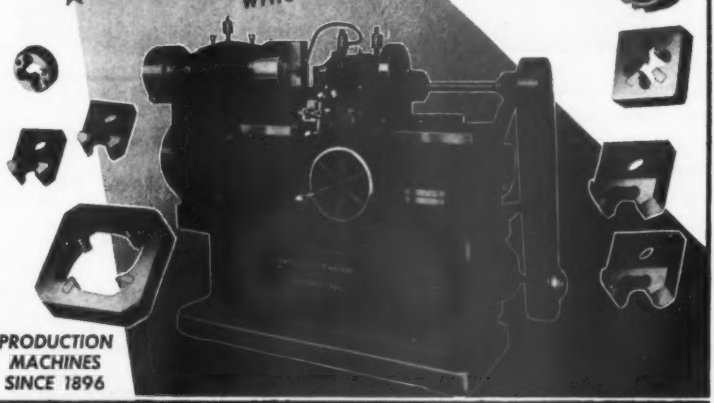
★ Any number of Lands eccentric or con-eccentric relief can be produced. Dies from 3/8" up to 2"

★ Equipped to give cutter speeds with infinite changes from 100 RPM to 650 RPM

★ Can thread round, square and inserted chaser dies

★ The most economical of ALL threading machines

Write for Full Particulars



PRODUCTION MACHINES SINCE 1896

The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U.S.A.

FOR 7" STROKE OR LESS...

You Can't Buy a MORE ACCURATE LOWER PRICED SHAPER!

If it's precision you want—if it's economy of operation, versatility in performance, the perfect shaper for you is the Ammco. No big machine on the market surpasses it in accuracy, yet its operating expense is remarkably low. Compact in design for plant or home use, low in price, the Ammco 7" Shaper is ideal for all work of 7" stroke or less. Why purchase a big, expensive machine when the Ammco does the accurate job you want at less cost? Bench or portable cabinet models. Write *today* for literature and prices. Address Dept. TD-77.

THE AMMCO SHAPER
Saves on:

1. **Time**
2. **Labor**
3. **Floor Space**
4. **Electricity**
5. **Set-up Expense**

AMMCO TOOLS, INC.

COMMONWEALTH AVENUE — AMMCO — NORTH CHICAGO ILLINOIS

SKILL IS BUILT INTO EVERY AMMCO PRODUCT!

INCREASE PRODUCTION

Highlight FEATURES

- Four Cutting Speeds—65, 93, 120, 149 strokes per minute.
- Self-aligning blades give absolute cutting accuracy.
- Stock is fed automatically to full capacity of machine.
- Machines swivel on base up to 45° permitting angular cutting without moving stock.
- Gears are in constant mesh, reducing amount of backlash to minimum.
- Positive compensating feed cuts more metal in less time.
- Transmission housed in oil-tight case.
- Spacer bar and scale accurately determine length of cuts—may be set for individual or multiple lengths.

SawMore
METAL CUTTING MACHINES

OUTSTANDING IN QUALITY—

Design and manufacture of SawMore machines are solidly based on years of experience. There is a SawMore Metal Cutting Saw for every metal cutting need. Made to meet Highest Standards.

OUTSTANDING IN ECONOMY—

Actual running conditions have proved SawMore Machines cut blade cost as much as 75%.

OUTSTANDING IN PERFORMANCE—

SawMore Saws cut metal faster. The positive compensating feed—gears in constant mesh—automatic bar feed carrier give highest cutting speed and greatest precision accuracy.

Write Today for Complete Literature—Prices—Detailed Specifications

IMMEDIATE DELIVERY

MAQUOKETA COMPANY
MAPLE STREET
MAQUOKETA • IOWA

ONE COMBINATION
R and L TURNING TOOL
Will Do The Work
Of All These For
Either Right or Left
Hand Operations

Patented in U. S. A. and Canada

- **Roller Box Tool**
- **Centering and Facing Tool**
- **Knee Tool**
- **Pointing Tool**
- **Back Rest**
- **Floating Drill Holder**
- **Balanced Turning Tool**

Fourteen tools are combined in one R and L (right and left) Combination Turning Tool, the only combination right-hand and left-hand tool on the market.

You can change an R and L Combination Turning Tool from right to left or vice versa in a matter of only ten seconds.

YOU WILL APPROVE THESE OUTSTANDING FEATURES

- **Made of extra tough, heat treated alloy steel; unconditionally guaranteed not to bend or give way**
- **Essential parts ground to extreme accuracy affording perfect alignment at any point of adjustment**
- **Back Rests, or burnishers, have almost diamond hard surfaces eliminating metal pick-up and marring of work surface**
- **Interchangeable Roller Back Rests furnished if desired**
- **Precise adjustment on both cutting tool and pressure of burnishers**
- **Tool bits wear longer because they are ground only on top side, or end**
- **Less cross-slide clearance required; saves time and often permits working with cross-slide tools while turning or drilling**
- **On turnings, the R and L Combination Tool produces highly polished surfaces, true to size, and straight**
- **Usable either for roughing or finishing; extra heavy cuts possible because thrust is always in direct line with Back Rest**
- **Longitudinal adjustment permits turning of two diameters to any length within tool capacity**

All these and many other features are shown by photographs in drawings in descriptive booklet mailed without cost or obligation. The booklet illustrates the tool set-up for various operations, and indicates speed and simplicity of its adaptation to various jobs. Prices and full specifications of many available sizes are included. Write for your copy today.

R and L TOOLS

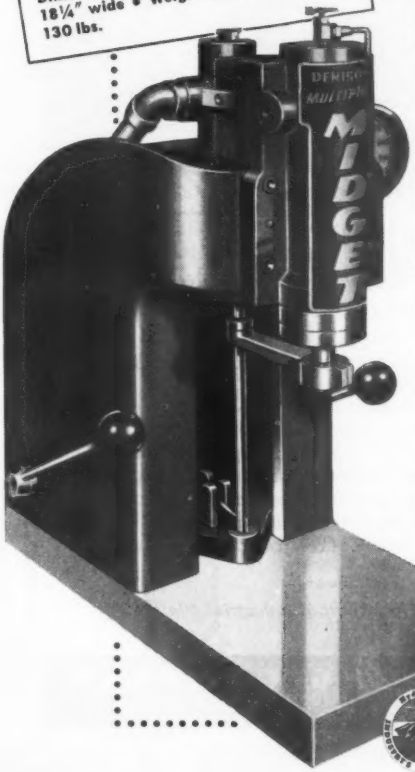
1825 Bristol Street
Philadelphia 40, Pennsylvania

Meet the new MULTIPRESS MIDGET

...a little press for big production

SPECIFICATIONS (basic unit)

• Capacity (ram effort), 1 ton • Stroke, 6" • Ram speed adjustable up to, 400 ipm down—600 ipm up • Daylight, 10" or 14" • Throat depth, 5" • Base Plate tooling area (optional), 10" x 10" (standard) • Dimensions, 24¾" high x 17" deep x 18¼" wide • Weight without base plate, 130 lbs.



Here's the new, low cost, MULTIPRESS Midget especially designed for your pressing requirements between 200 and 2000 lbs. ram effort. All the famous, production-boosting features of the larger size MULTIPRESS are found in the Midget. Vibratory repeat strokes, fast approach and slow pressing speed, either dual hand lever or foot pedal safety controls—plus adjustable stroke length, ram speed and pressing effort.

The MULTIPRESS Midget is ideally suited for multiple or "gang" installations and for successive operation requirements. Up to 12 units may be used with a single, centralized power source. When more than one Midget is used, each unit has individual pressure adjustments.

Various types of optional equipment can be furnished, including a choice of four pumping units for operation of the MULTIPRESS Midget individually or in series of 4, 8 or 12 units.

Write today for descriptive bulletin on this newest addition to the MULTIPRESS line.

THE DENISON ENGINEERING COMPANY
1197 Dublin Road • Columbus 16, Ohio

DENISON EQUIPMENT for APPLIED Hydraulics

Another

DE-STA-CO CLAMP Designed to *Take It!*

A new addition to the versatile De-Sta-Co family of production clamping tools. No. 464 Portable Clamp designed for sheet metal work. Positive toggle lock holds parts fixed for drilling, riveting, welding. Speeds assembly of ducts, housings, cabinets, auto bodies. Ideal for template work.

No. 464 Plier Clamp offers a firm hand grip for opening and closing. Jaws clear flanged metal edges. Adjustable for efficient pressures. Narrow nose for close spaces. Entire tool is forged and can be altered easily for special application. Replaceable hardened steel bushings minimize wear. Write for additional information on Model 464, or catalog No. 47 describing complete line.

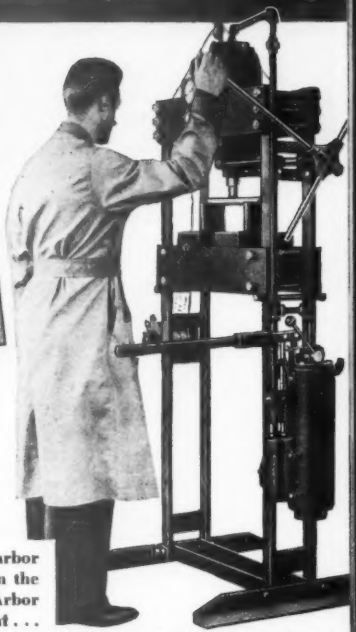
De-Sta-Co clamps are stocked in principal industrial centers

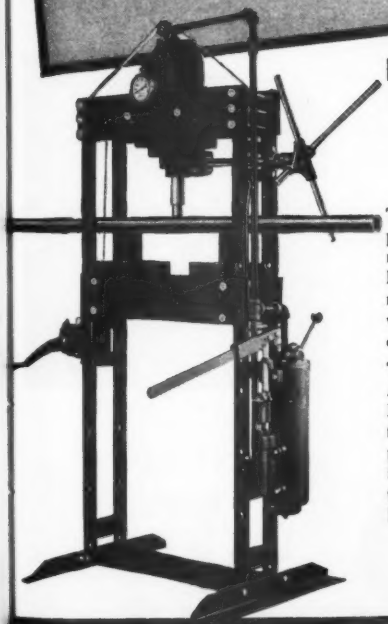
DETROIT STAMPING COMPANY
3444 Midland Ave. Detroit 3, Mich.

Save time ON PRESSING, BENDING, STRAIGHTENING WITH A

KRW HYDRAULIC ARBOR PRESS

INDISPENSABLE IN ANY SHOP ...HANDLES SHORT-RUN PRODUCTION WITH LOW-COST DIES ...AVAILABLE IN 25 TO 75-TON CAPACITIES, EITHER HAND-OPERATED OR MOTOR-DRIVEN, WITH VERTICAL OR HORIZONTAL RAM TRAVEL.





KRW HAND-OPERATED PRESSES

The old conception of an arbor press is as different from the modern KRW Hydraulic Arbor Press as day is from night . . . now they are built in innumerable shapes, sizes and adaptations to work on hundreds of production jobs other than common straightening, bending and pressing work.

They are available as speedy Hand-Operated Presses; highly flexible Air-Operated Presses or as versatile and effortless Motor-Operated Presses. Then too, they are built in almost any conceivable physical form . . . tall, short, narrow, vertical or horizontal standing, as gap presses, forming brakes and many other designs. Mass production in a modern plant keeps KRW prices at rock bottom and quality at the highest possible peak. Write for the KRW illustrated Press Catalog. Mail the coupon for your copy now.

K. R. WILSON

K. R. WILSON, 215 MAIN ST., BUFFALO 3, N. Y.

Please send me information regarding

KRW Hand-operated Presses ☐
KRW Air-oil Operated Presses ☐
KRW Motor-Driven Presses ☐

18.

Name_____

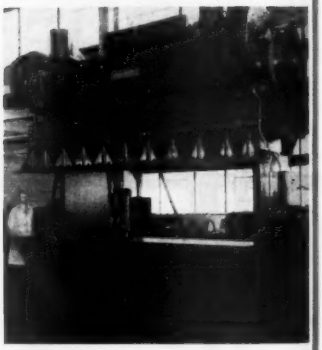
Address_____

Use a Press Brake...

FOR BENDING

FOR MULTIPLE PUNCHING

FOR PROGRESSIVE FORMING, PUNCHING, NOTCHING



FOR PRESS WORK

Many a job is best on a Cincinnati Press Brake. This versatile machine forms, bends, corrugates, punches, notches . . . using simple low-cost dies for jobbing work, or progressive and multiple dies for quantity production.

Its wide utility reduces manufacturing costs . . . its unusual accuracy pays on the assembly line . . . it's a producer of double dividends.

Write for Brake Catalog B-2.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS · SHEARS · BRAKES

Editorial Index

	Page
Editorial: For Greater Editorial Service	69
For Deep Drawing . . . Mechanical Or Hydraulic Presses?	70
Identification Of War Steel Bar Stock by A. W. Ehlers	76
Contour Sawing Practice As Related To Press Work by H. J. Chamberland	79
Production Up, Down-Time Down	84
Carbide Inserts Eliminate Die Servicing	86
Temporary Tooling For Metal Luggage by A. H. Blacker	88
New Controlled Cut 3-Dimensional Miller	96
Press Tooling And Production Of Electric Motors by Ronald Brennan and Walter J. Zimmerman	98
Press Alignment Of Punches And Dies	104
"Pictures" Of Quality	106 C
Machine Tool Show, September 17-26	106 D
Detroit Stamping Expands Facilities	106 E
New Press Plant	106 E
Progress-on-Parade	108
Publication Previews	127
Shop Aids	137
Temporary Dies, Methods And Applications	140
"Hypermatic", High-Velocity Stamping	144
Marking . . . A Die And Stamping Necessity	146
Images Reverted To Upright Position By New Locating Microscope	147
Contract Tooling And Production	164
The Curb	166

This difficult operation,—a one-draw, severe reduction, required a correctly designed die with Firthaloy for wear resistance in the hole, and hardened top face for wear resistance against wrinkling.

There's more to a good deep drawing die than simply a carbide insert in a steel casing. Firthaloy engineering skill based on past experience in the deep-drawing field; correct design based on established practice; proper selection of materials; accurate specifications to meet the individual needs of the case . . . are reasons why FIRTHALOY DIES assure size control, surface finish, trouble-free operation, long life and low die cost per piece.

Call **Firth Sterling**

STEEL & CARBIDE CORPORATION

for greater editorial service

This sheet metal die and stampings feature issue of TOOL & DIE JOURNAL represents an adventure in editorial policy. We use the word policy in a flexible and experimental sense because all TOOL & DIE JOURNAL editorial presentations are measured by yardsticks of reader service and approval. This policy has evolved through combining the following two sets of seemingly unrelated circumstances:

First, we have been given many versions of how TOOL & DIE JOURNAL back issues are kept for reference, i.e., "swiping them" to take home, "a shelf in the boss' office," and formal plant library procedures where, after initial routing among operating executives, each issue is filed for reference or circulation.

Second, as TOOL & DIE JOURNAL has grown in industrial circulation so has its editorial coverage. To those "in the know", the tool and die connotation in our good name is not to be taken too literally nor in a limiting sense. Our readers have become largely responsible for the editorial premise displayed on our front cover, i.e., *the design, manufacture and use of production tooling*, because they are constantly advising us as to what they want even though sometimes they may not be conscious of lending such a helping hand.

A superintendent asks us what we've run on a given subject. If we've presented relatively little, and if the subject is of growing interest, we take steps. A reader may inquire as to what we have brewing on a subject of special interest to him. If we can project his interest into the activities of others, we procure know-how material from recognized authorities. Increased inquiries on certain tooling or on working a particular material are editorial musts.

We even accept compliments on what we publish as an indication of what the reader wants kept coming! And, when a production tooling authority submits an article for publication, we feel that our efforts are thereby endorsed by his acknowledgment of our reader acceptance and his recognition of TOOL & DIE JOURNAL as the most appropriate channel of communication in his chosen field.

There, then, are the two sets of circumstances that jelled into this feature issue: the evidence of the long-time reference life of TOOL & DIE JOURNAL, and the evidence that our editorial efforts do conform to what is wanted. Hence, the question that is always before us as to how we can improve the service rendered by TOOL & DIE JOURNAL almost answers itself. Simply by further trying to enhance the reference value of a given issue.

Because one issue cannot cover everything for everybody, why not choose certain vital topics of widespread interest and concentrate on those topics in specific issues? Thus we can attempt to explore one field more exhaustively and, by the same token, increase the long-time reference value of those issues.

This July 1947 TOOL & DIE JOURNAL, featuring sheet metal dies and stampings, presses and press tooling, is an attempt to better serve our readers. The lion's share of major features and departmental shorts is of right-now, know-how value and appeal to those in the die and stamping industries.

We are not unmindful of other subjects equally important to our *design, manufacture and use of production tooling* readership. We are willing, however, to rest our case with this first feature issue as part of a continuing program of more and better editorial material, packaged in the most usable and lasting manner.

E. Willard Pennington

editor

A TDJ FEATURE PRESENTATION **DIES AND STAMPINGS**

For Deep Drawing . . .

Mechanical Or Hydraulic Presses?

Editor's Note: *This evaluation of the many factors influencing the selection of presses for specific jobs was prepared exclusively for TOOL & DIE JOURNAL'S sheet metal die and stampings feature issue. Its great practical value stems from the combined source of the data presented, i.e., a large manufacturer of both mechanical and hydraulic presses and a large user of both mechanical and hydraulic presses—E.W.P.*

Press selection for any job rests on four basic considerations: class of work, operating speed, efficiency and maintenance. Where a company's products are specialized and few, produced in quantities of hundreds of thousands, or millions of duplicate items and in continuous runs, equipment selection is fairly simple. Comparative figures for the same job, as run on both mechanical and hydraulic presses, are a positive yardstick with which to measure the relative merits of each, *for that one job.*

But what equipment is best suited to the needs of the stamping plant who must: furnish shallow-, intermediate-, and deep-drawn components in a variety of materials; produce them economically in comparatively short runs of 10,000 or less; with a minimum of scrap loss because of material shortage; with the least setup time and number of operators because of skilled labor costs, without danger of maintenance slow-ups, because of customers' urgent needs?

Some interesting answers to these questions are supplied by the Strong Manufacturing Company's plant in Sebring, Ohio, where 54 drawing and stamping presses are in daily use. One of the largest manufacturers of its kind, Strong sub-contracts for 85% of the enameled components used by five major suppliers of home refrigerators. Strong

Fig. 1. Versatile equipment is required to produce this variety of formed and drawn articles for enameling.

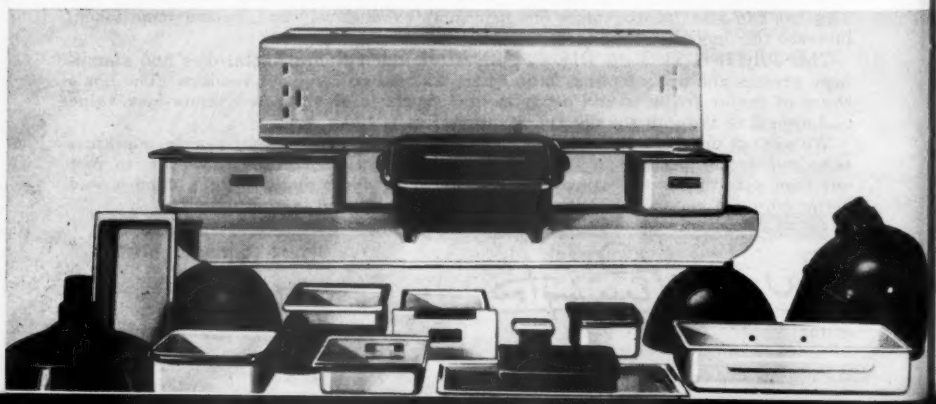


Fig. 2. A very low percentage of scrap loss characterizes this double action hydraulic press with quick return drive and automatic pressure reverse. Material is deep drawing enameling iron.

is also sole producer of the enameled reflectors for a major corporation's complete line of industrial and arena lighting fixtures and of the well and inset for its popular electric roaster. Figure 1 gives some idea of the variety of the Strong Company's manufactures.

It is characteristic of the company's progressive policy that in 1946, after 42 years' use, exclusively, of mechanical presses, it added two major installations of hydraulic drawing equipment to its expanding facilities. Having operated only Bliss, Consolidated and Toledo presses since 1903 (one of which, purchased in that year, is still in use), Strong also consulted the E. W. Bliss Company on its hydraulic press needs.

First delivery was a 75-35 ton double-action hydro-dynamic drawing press, Figure 2, to which Strong's planners assigned a home refrigerator vegetable pan, deep-drawn in one operation. This product had to be dimensionally accurate for a balanced fit in its compartment, free of wrinkles and burrs for proper enameling and capable of being beaded in a second operation without intermediate annealing after the draw. Bliss service men were called in for the tryout. Dies from a Bliss 3¾-B toggle press were set in the new machine and the first blank inserted. The job had been run before in a mechanical press with fair results, so that there was no question of faulty dies or stock.

The press was set to reverse itself upon build-up of a pressure calculated to be sufficient, under ideal conditions, for the job.

The first stroke of the press produced a perfect piece! Without further adjustment, an initial run of 10,000 pieces was made, of which only 4 were rejected.

Results in this instance, although impressive, are not sufficient basis for an unconditional recommendation of hy-

Fig. 3. Toggle presses are mechanically simple, fast, easy to maintain. A Bliss 3¾-B is shown making the one-operation draw of a refrigerator component.

Fig. 4. Toggle presses are generally preferred to hydraulics for double action, progressive drawing of small-diameter shells. This Bliss 3½-B is faster than comparable double action hydraulics, and the higher percentage of scrap loss involves relatively little stock.

draulic presses for all drawing applications. Nor does Strong make such a mistake. The company lists many jobs in its regular operations that best lend themselves to one, two or three successive mechanical press draws. In 1946, the same year that two new Bliss hydraulic presses were delivered, Strong also had delivery of two Bliss toggle drawing presses, Figure 3, which remain in constant use. The company's output during the year was more than double that of a similar pre-war period; partly because of added facilities, partly through improved job planning and the elimination of steps in operation made possible by more flexible equipment.

Reluctant to generalize on a subject involving as many variables as press work does, T. S. Hipkins, Jr., Strong's pressroom foreman, admits a preference for hydraulic presses in the deep drawing of large items from stock of varying thickness and temper.

For one thing, the hydraulic press cannot be overloaded; its safety reverse does away with the problems of mechanical press and tool damage and of waste product, all caused by irregular stock thickness under the blankholder.

Second, uniform speed and pressure throughout the hydraulic press stroke permit deeper one-operation draws, sharper radii on punches, dies and draw rings and provide full capacity at the beginning of the draw. Less vibration, fewer adjustments, longer tool life, are characteristics of hydraulic operation.

On the other hand, for cylinders of small diameter, deep-drawn in three or more operations, Strong continues to use Bliss double-action toggle machines. The main reason given is the greater speed of the small toggle presses.

On large jobs, a quick return feature, plus less breakage, permits hydraulic press production to equal or exceed that of mechanical presses. But, small, easily handled pieces allow almost continuous operation of a toggle press and their area is such that breakage represents relatively small material loss. Such a job is the reflector extension, shown undergoing its final draw on a Bliss 3½-B

Fig. 5. For swaging small bottom-radius grooves in work-hardened material, the constant blankholding pressure and uniform stroke of this hydraulic press hold breakage to a minimum.

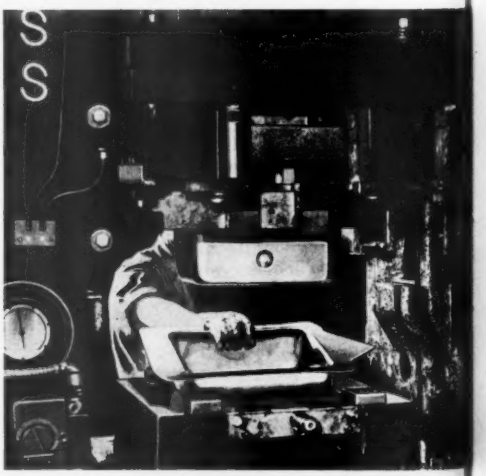


Fig. 6. Deep-drawn items run a gantlet of secondary operations through the stamping department on their way to the pickling tanks. Right to left are: an inclinable press (embossing lugs), an air punch (holes for nameplate), two underdrive weldment frame presses (handle and hang-up holes). Power requirements are small, tools simple, maintenance light.

toggle, Figure 4. Similarly, for forming jobs that require blankholder pressure, the faster toggle presses are preferred, with some exceptions. One such exception is illustrated by Figure 5, wherein the Bliss 75-35 ton hydraulic is shown swaging guide grooves in refrigerator vegetable drawers.

Strong uses only mechanical presses in the stamping section of its pressroom for all single-action piercing, embossing, forming and shearing operations. Short strokes and light pressures are required for the work in this department, Figure 6, and mechanical equipment offers the advantages of greater speed, less weight, lower initial cost.

In considering maintenance of the two types of presses, Mr. Hipkins, Jr., finds advantages in each type. Although more accessible and simpler in its working parts, the mechanical press requires more frequent attention. In either case, Strong has been able to cope with most of the maintenance problems found in the normal course of its operation and sees some profit in the fact that ultimate responsibility for the performance of all its machines, mechanical and hydraulic, rests on a single supplier.

Mr. Hipinks, Sr., chief of the die department, adds this interesting fact to his son's observations: prior to the installations of hydraulic presses, there was no means of testing the pressures required of mechanical presses by certain jobs. In running the same jobs on hydraulic presses, wherein pressures are indicated by gauges, it was discovered that many of the jobs had been exceeding the capacity of the mechanical presses formerly used to produce them.

The large pressroom finds use for both mechanical and hydraulic equipment, not only for different jobs, but often for the same job. A product typical of such teamwork is the "well", Figure 7, extreme right, for a major supplier's electric roaster.

Blanks of cold rolled, deep-drawing steel, .034" thick, for the roaster well are partly developed from stock sheets by one cut each on a straight power shear. Next, they are dipped in a hot solution of Gilron "Drawcote" and heat-dried, to leave a thin film of the lubricant on both sides of each blank.

Fig. 7. Left to right are: inset, complete assembly, and "well" for an electric roaster. Both mechanical and hydraulic presses feature in the intensive production of this item.

A Bliss No. 21½-A inclinable press, fitted with notching dies, Figure 8, is used to complete the development of the blanks, and they are then ready for the drawing operation.

Figure 9 illustrates the Bliss 250-125 ton, double-action hydraulic press, which draws the roaster wells at a rate of 250 per hour, with a fraction of one percent rejected. Even this small waste is believed to be due to unavoidable variation in quality of the stock. The "Drawcote" compound used here is dry, almost invisible, does not pick up waste and re-

quires a blankholder pressure of only 40 tons for wrinkle-free draws.

The draw press is fitted with a cushion for panelling the well's bottom, which also returns the product to the top of the die for unloading. The operator feeds it by gravity down a chute to the opposite side of a No. 93-60 Toledo double crank press, where the flange is trimmed and the edge beaded in a combination blanking-forming die, Figure 10. This die is so designed as to eliminate a former burr-grinding operation.

Following the trimming and beading, the roaster well is panelled on four sides in a single-action forming die, fitted to a No. 85 Consolidated endwheel press. Panelling adds to the workpiece's rigidity and removes any minor irregularities resulting from the drawing operation.

A special jig positions four legs and a switch bracket for spot-welding to the roaster well. Legs themselves are made in two operations, using a Bliss 21½-A inclinable press.

Like all the Strong Company's products, this item is given two coats of permanently burned-on porcelain enamel. The metal must be entirely free of surface impurities to insure the proper color and set of the enamel. Careful pickling is, therefore, an important phase of the manufacture. At present Strong is using two semi-automatic pickling lines, made up of acid, nickel and rinsing solutions in cypress, rubber-lined steel tanks. Soon to be in operation as a part of the company's expansion program is a Steven's fully automatic pickling plant; one of the few in the enameling industry, which will replace present semi-automatic lines.

Preparation of the enamel itself is the responsibility of an entire department.

The basic ingredient of vitreous enamel is "frit". This is a complex mixture of some 22 compounds which, when

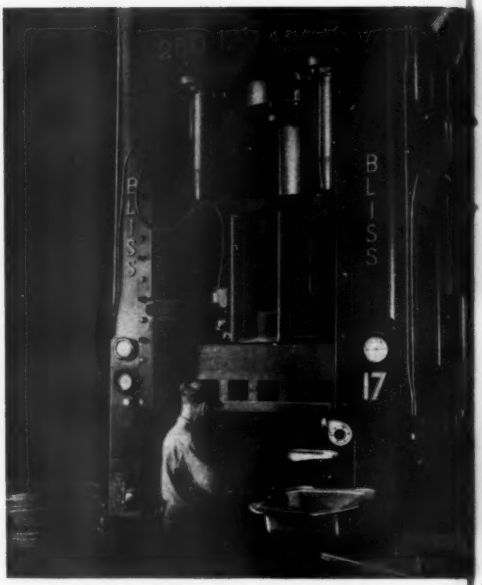


Fig. 9. Improved quick-approach and quick-return features, plus nominal scrap loss, place modern hydraulic presses in productive competition with all types of mechanical drawing presses for jobs of such a large area as this one.

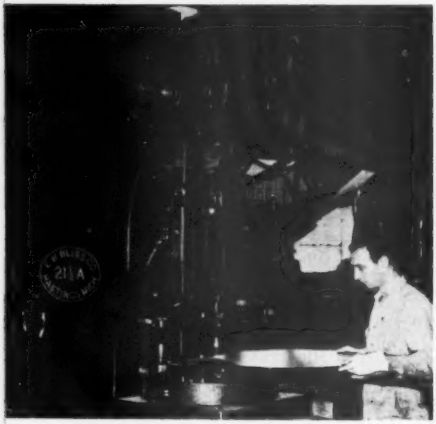


Fig. 8. A blanking die and the press necessary for a blank of this size would represent a major capital investment. Here, a Bliss inclinable press, fitted with shearing dies and gages, generates the blank from a rectangle in four strokes.

smelted and poured in a thin, molten stream into cold water, is exploded by the temperature change into hard, glass-like particles resembling coarse ice-cream salt in texture. What smelting Strong does is for reclamation purposes only, as most of its "frit" is obtained in large quantities from outside suppliers.

Reduction of the "frit" to a smooth, liquid consistency is carried out by the tumbling action of loose porcelain balls in a "frit" mill. The mill proper, a large porcelain-lined sheet metal cylinder, is driven on a horizontal axis. The mill-balls gradually crush the coarse "frit" into fine particles, which, mixed with water and clay in the mill, form a liquid enamel. When fired, this enamel resembles glass in its hardness and finish.

Dipped in this enamel, products are conveyed through furnaces of carefully controlled, 1540° F temperature. The plant has three such furnaces, fed by monorail chain conveyors, Figure 11, travelling at a rate of 9½ feet per minute. Two coats of enamel are applied, with a firing-time exposure of 3½ minutes for each coat.

Although the products are handled automatically, a large number of operators are required in this department for close inspection at all points. Many delicate hand operations are necessary along the enameling line to insure a product of consistently high standards. Color control is a touchy matter and extreme care is essential to prevent the color changes that result from the slightest contamination. Only minor faults are allowable for salvage; scarred, blistered, or off-color products are summarily rejected.

W. U. Pfaeffli, Strong President, is proud of the company's record since its reorganization under the present management in 1932. He attributes this success to intelligent planning, amicable relations with labor and personnel and to keeping abreast (or a jump ahead) of technological developments in the press and enameling industries.

W. H. Metz, Executive Vice President, is now carrying on the company operations, having been with the company approximately three years. He has played a major part in regard to the installations and reconversion from war materials to peacetime products.

Fig. 10. Mechanical presses perform secondary operations on the hydraulic press draw. Compound dies, such as this combination beading and trimming setup, can eliminate handling, increase man-hour productivity.

Fig. 11. Hung on an endless monorail conveyor, freshly dipped enameled ware enters at left into this gas-fired furnace; emerges a few minutes later with a hard, dry, fused enamel coating. Gas-fired furnaces usually incorporate oil converters to attain correct temperature in very cold weather.

Identification Of War Steel Bar Stock

Part I

by A. W. Ehlers
Contributing Editor

During the war years, bar stock poured into steel storage bins all over the country. The large plant in Altoona and the alley shop in Ashtabula signed and countersigned, cussed and discussed, the priority forms and ratings while steel rolled in for jobs A to Z.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

★ EDITOR'S NOTE: *This very timely article by Contributing Editor Ehlers should prove of great material benefit to those TDJ readers who may be experiencing the same exasperations. In his work in the field of automotive parts manufacture, Mr. Ehlers is noted for coming up with practical, work-a-day methods for accomplishing desired end results with a minimum of theory and waste motion. Part II, to follow next month, will provide working instructions and equipment descriptions for steel identification by Chemical Spot Testing, Magnetic Comparator and Cathode-ray Oscilloscope methods. E. W. P.* ★

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Stock Bin Chaos

Many a steel stock clerk merely carried the identification, "Job No. S-12B6". Steel clerks figured that the only way to keep up with the steel substitution problem was to identify bar stock for "that transmission part" by the job number alone. The B/P originally might have specified a Moly steel, A-4023; however, the alloy situation might soon have forced the War Production Board to change to NE-8020. The planning department, the foreman or the purchasing agent, as the case might have been, called his steel source and the newly specified steel poured in for the transmission job before the old bars in the allotted steel racks were all used.

The steel bin clerk scratched out one number, entered another number, waited for a laboratory analysis report if the shop had a lab, and put the stock in bins R-26 and R-27 regardless, while he went on his daily merry-go-round or collapsed of overtime dementia.

The steel bin clerk either went to Officer Candidate School and became a Major in the Air Corps or married the red-headed stock chaser in Building 42 and went to California. Anyhow, only Elmer Suggs knows that bins R-26 and 27 are holding 26 bar lengths of 1.625"

FIGURE 1. SAMPLE CHART OF BASIC SPARK PATTERNS.

#1. APPROX. 0.20 % CARBON

(BRILLIANT YELLOW-WHITE STREAM DEVELOPING INTO A SHORT SPEAR, SMALL BURST AND STRAIGHT PRONGED FORK.)

#2. APPROX. 0.35 % CARBON.

(BRILLIANT YELLOW-WHITE STREAM DEVELOPING INTO A LARGE BURST WITH CENTER AND DENDRITE BURST STREAMERS ENDING IN STRAIGHT PRONGED FORK.)

#3. APPROX. 0.16 % CARBON AND 20 % NICKEL

(DULL WHITE STREAM DEVELOPING INTO A SHARP DASH AND ENDING IN FAINT CARBON PRONGED FORK.)

#4. TUNGSTEN AND MOLY H.S. STEEL.

(DULL RED OR ORANGE RED SHORT STREAM ENDING IN TONGUE – SPEAR POINT.)

#5. LOW TUNGSTEN DIE STEEL

(DULL RED SHORT STREAM DEVELOPING INTO A FINE BURST ENDING IN DROOPING TONGUE SPEAR POINT.)

#6. CARBON TOOL STEEL.

(SPARKLER-WHITE SPRAY)

NE-8020 and 4 bar lengths of A-4023. The new stock clerk notes a grease-stained tag marked "S-12B6" tacked over the bins; checks his steel book for identification and finds none; checks the lab who says, "there ain't no such steel", and finally gives up. Of course, sample analysis as to the chemistry of the steel can be accomplished for each bar end in the laboratory, but this method is very costly and for shops not equipped with a complete metallurgical lab it is an impossibility.

The reader may have kept his stock bins in apple-pie order and his steel records intact. However, many a reader will recognize the situation as typical and will recall, in nightmare sequence, the hectic days of cancellations and the resulting chaos in the stock bins.

To clear up the cluttered bin problem, the plant usually calls in the local scrap dealer and disposes of many a good bar of serviceable steel at scrap prices to the loss of all concerned. The taxpayer and the consumer eventually pay for this waste just as sure as they all pay taxes.

The War Assets Administration now is attempting to liquidate many a steel stock pile at very reasonable prices. However, the records pertaining to the steel are no better than the originating source. This originating source might have been a transplanted civil service clerk or a gum-chewing stenographer copying from penciled records at a feverish pace to keep up with the "fifteen" copies needed to clutter up the files in various agency offices. Buying such steel is like buying a pig in a poke unless the buyer has some method of quickly checking the analysis records as to their accuracy and completeness.

Methods Of Testing

The writer has found that there are six methods of testing steel bar stock for identification and is listing them in sequence of the completeness of verification.

1. Spark Testing.
2. Pellet Testing.
3. Chemical Spot Testing.
4. Magnetic Comparator Testing.
5. Cathode-ray Oscilloscope Testing.
6. Complete Chemical Analysis.

Spark Testing

The first method, spark testing, is an old technique used in tool rooms and blacksmith shops to separate low carbon steels or machine steels from tool or die steels. An attempt has been made to use the spark testing technique to finer advantage in steel separation, but to the writer the technique depends too much upon meticulous comparisons of minute spark pattern details to prove adequate as a dependable method for use by shop men. However, once the basic differences of spark pattern detail are mastered, a good operator can use the comparison between sparks of a known sample and the sparks of the unknown steel to a fair determination of a steel family group. A trained female operator is considered by the writer as better qualified to visually record and retain the pattern differences so necessary to this type of identification. The average male steel handler or steel bin clerk cannot be called upon to differentiate between orange-red bursts and yellowish-red bursts and cares little for filagree or dendrite pattern design.

Preparation For Spark Testing

To prepare for spark testing of steels, the operator should have a high speed power grinder, either of the stand or portable type. The surface speed of the grinding wheel should be within the limits of 6000 to 8000 surface feet per minute for good results. The grinding wheel should be of 46 to 60 grain size and of medium hardness of bond, approximately J or M.

Conditions Of Test

To establish some measure of control on a series of tests, the following conditions should be maintained:

1. Sparks to fly horizontally from the grinding wheel.
2. Sparks to pass before a dark background.
3. Pressure of specimen against the grinding wheel to be maintained as closely as possible as a constant between the testing of the known specimen and the unknown sample.
4. Frequent grinding wheel dressings

(CONTINUED ON PAGE 149)

Contour Sawing Practice As Related To Press Work

by H. J. Chamberland
Springfield, Mass.

The metal working industries have enjoyed the economies of specialized band sawing for approximately twelve years and what has been accomplished over this period could only be described in book form. It can truly be said that, as a whole, band saw practice has in very recent years been revolutionized with the introduction of high and super-high velocity equipment. Cutting rates now possible on non-metals and non-ferrous metals to full machine capacity height, and on ferrous metals within certain thickness limitations, have practically antiquated conventional speeds.

However, when considering the contour sawing process, particularly from the tool room angle, saw control factors of old still prevail. This is indeed true in regard to steel alloys which represent the bulk of tool room production. The fact remains that high velocity sawing is still "actual" sawing, and since the light metals and many types of plastics are becoming of more frequent tool room concern, and because they can be more efficiently cut at high velocities, the production engineer or foreman should be in position to take advantage of the new technique. On the other hand, when high and super-high velocities are applied to ferrous metals, the cutting operation is one of friction sawing and, like flame-cutting, the process is one of separating metal rapidly rather than one combining quantity and quality.

It is true that standard contour sawing has experienced little change, from the viewpoint of saw pitch, set and speed, as applied to steel. What is highly significant is that we have far better cutting tools than a decade ago. For this reason and by giving more consideration to saw lubrication, cutting rates have been increased by 25% to

Fig. 1. Contour sawing machine production line, showing original model in foreground. Primarily developed to expedite the making of blanking dies, the process now covers the fabricating of some 200 basic materials with saw velocities ranging up to 15,000 fpm.

Fig. 2. This old method of sawing the die opening results in a waste slug that cannot be used as the punch, because of the location of the holes for starting the cuts.

35%. Needless to mention that the development of larger and larger machines along with ingenious devices to accelerate production have multiplied the original blanking die processing purpose of this equipment a thousandfold.

In this article we shall consider briefly, but explicitly, those contour sawing techniques related to stampings.

The production of stampings involves the need for a punch and die which can be contour sawed by two distinct methods. By standard procedure it is true that the slug removed to generate the die outline is intact, but a somewhat larger piece of steel is required to make the punch. In making a small die as shown in Figure 2, material waste would be negligible, but if the die were of such a size as to involve some 25 lineal inches of cutting, the slug would be practically worthless and considerable material waste would again be involved in making the punch. A die of square or rectangular shape would of course modify the waste material condition.

Now suppose that the punch and die could be made from the same piece of steel; in other words, save the slug to make the punch. This can be done in at least 50% of blanking die requisitions and the economy is tremendous as will be shown later. The punch and die pair shown in Figure 3 is processed by this technique.

When the quantity of stampings desired is more or less limited, meaning extremely limited production, the question arises as to what effect die cost will have on cost per piece. This problem is usually solved by actually contour sawing the blanks to shape. Figure 4 shows how the stack of blanks is prepared for the operation.

How to Estimate Cost of Contour Sawing Die Outline

As previously stated, not all dies can be made by the unique contour sawing technique, and standard procedures involve as much time in sawing out the punch as is required for sawing the die opening. The prime factor is the cutting efficiency of the saw. The saw control factor as determined by the machine dial chart is of little value unless the saw is particularly developed for contour sawing. Any good metal cutting saw will do for straight sawing, but unless it has the correct depth of tooth hardness it will not resist the strains of contour sawing for any length of time.

Fig. 3. A punch and die pair made from the same piece of steel. By the latest technique, the slug is saved and becomes the punch.

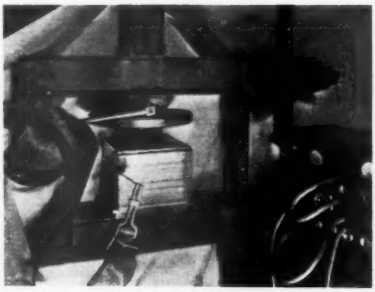


Fig. 4. Where "stampings" are required in too limited quantities to justify blanking, they may be contour-sawed to shape after the blanks, under pressure, have been bead-welded at the corners.

Material Thickness	Tool Steel	High Speed Steel	High Chrm. High Carb. Steel	Cold Rolled	Cast Iron
¼"	4¾"	2⅜"	1½"	9"	15½"
½"	2¼"	1⅛"	¾"	4"	7 7/16"
1"	1"	½"	⅜"	1¾"	3¼"
1½"	⅝"	5/16"	¼"	1⅛"	2⅛"
3"	9/32"	5/32"	3/32"	½"	1"
6"	⅛"	1/16"	1/32"	¼"	7/16"

Fig. 6. Band Saw Cutting Rates: Lineal inches per minute (average).

band would expedite the operation tremendously. After all, it is but a matter of five minutes to change bands when internal sawing, and of less than one minute when external sawing.

The cutting rates given in Figure 6 for different materials and thicknesses are not maximum, but serve only as a stepping stone to a fair estimate. Any experienced and attentive operator should surpass all rates listed by at least 25%, and particularly so if drip lubrication with a high grade cutting oil is applied to the saw teeth.

Fig. 7. Comparison of cutting rates for Friction Sawing with Flame Cutting, in lineal inches per minute. Friction Sawing rates are based on average performance and could be higher or lower, depending on type of equipment and operator skill.

FLAME CUTTING											
Material Thickness	¼"	⅜"	½"	¾"	1"	1½"	2"	3"	4"	5"	6"
Width of Kerf	5/64"	3/32"	3/32"	7/64"	7/64"	⅛"	9/64"	11/64"	11/64"	3/16"	3/16"
Cutting Rate	20"	19"	17"	15"	14"	12"	10"	8"	7"	6"	5"

FRICTION SAWING										
Material Thickness	1/16"	⅛"	3/16"	¼"	5/16"	⅜"	½"	⅝"	⅞"	1"
Width of Kerf	1/16" maximum----------width of kerf remains constant									
Cutting Rate	125"	72"	60"	46"	39"	32"	26"	21"	15"	8"

As shown in Figure 5 of a demarcation line being made visible by an acid test, the depth of tooth hardness must extend to the very bottom of gullet line but not beyond. When the saw is so hardened, the teeth have flexibility at the proper location. This, combined with differential heat treating which produces a diamond-hard tooth point, results in a fast cutting saw of long life.

Another factor, too often disregarded by the operator, is the advantage to be gained by using two or more blades of different widths to generate an outline. Because one has to use a ⅛" or 1/16" wide saw to navigate the shortest radii or curves is no excuse to cut some 20" or more of a near straight line with the same narrow saw when the increased work pressure possible with a ½" wide

Fig. 5. An acid etch demonstration of the desired hardness pattern for saw blade and teeth.

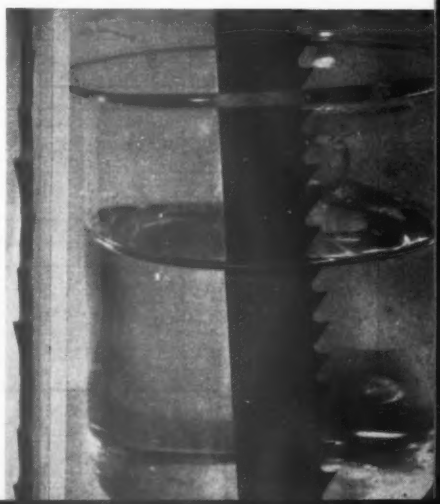


Fig. 8. Typical friction sawing production job at a cutting rate of 22" as compared to a band sawing rate of 2⅝" for the ½" armor plate involved.

Assuming therefore that the material to be sawed is 1½" thick high chromium-high carbon steel and that the

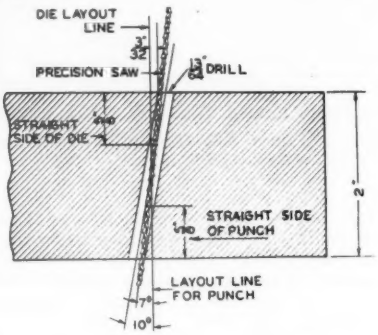


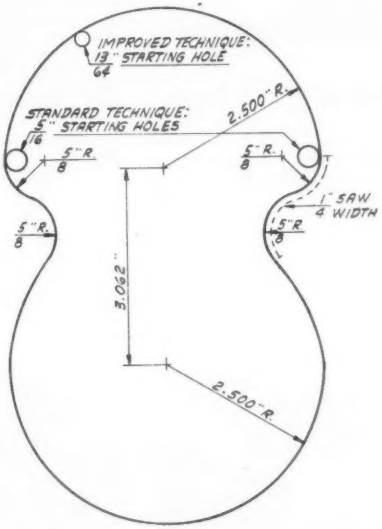
Fig. 9. Diagram of the layout and die sawing technique that results in a slug of sufficient area so that it can be used for making the corresponding punch.

Fig. 10. The dimensions determining the setups in following the method illustrated by Figure 9 for die blocks ranging from ½" to 6" in thickness.

Die Thickness	Angle of Saw Starting Hole	Angle for Saw Cut	Distance from Die Layout Line to Center of Saw Kerf	Distance from Die Layout Line to Center of Starting Hole	Diameter of Drill	Width of Starting Saw	Amount of Straight Sides on Punch and Die
½"	21°	18°	5/64"	3/32"	1/8"	3/32"	3/16"
¾"	18°	15°	3/32"	1/8"	1/8"	3/32"	5/32"
1"	14°	11°	3/32"	1/8"	5/64"	1/8"	3/16"
1¼"	12°	9°	3/32"	1/8"	5/64"	1/8"	15/32"
1½"	11°	8°	7/64"	5/64"	5/64"	1/8"	5/16"
2"	10°	7°	1/8"	3/16"	13/64"	3/16"	7/16"
3"	9°	6°	5/32"	1/4"	17/64"	1/4"	1⅛"
4"	8°	6°	7/32"	5/32"	17/64"	1/4"	1⅝"
5"	7°	6°	1/4"	7/16"	17/64"	1/4"	2¼"
6"	6°	5°	1/4"	5/16"	17/64"	1/4"	2½"

Die Thickness	Minimum Outside Radius	Minimum Inside Radius	Saw Width
½"	5/32"	1/8"	3/32"
¾"	5/16"	1/8"	3/32"
1"	7/16"	1/4"	1/8"
1¼"	7/16"	1/4"	1/8"
1½"	15/32"	1/4"	1/8"
2"	9/16"	7/16"	3/16"
3"	7/8"	9/16"	1/4"
4"	1 1/32"	9/16"	1/4"
5"	1 1/16"	9/16"	1/4"
6"	1⅛"	9/16"	1/4"

Fig. 11. Sawing out this punch and die by the new technique results in a material saving of approximately 20 lbs.



cut represents 14" lineal inches. With an attained cutting rate of ⅜" per minute, the operation would consume nearly 40 minutes. Sawing the punch would require approximately the same time. The band filing operation depends to a great extent on the dexterity of the operator in originally following the outline when sawing. Generally speaking, filing the die to the line and final fitting of the punch to die should not take more than one and one-half the complete sawing time.

Low operating cost is another economy angle of the contour sawing process and, under existing conditions, labor, power and normal tool depreciation combined seldom exceed $1.60 per hour. It is therefore apparent that a die combination of dimensions as above mentioned could be contour sawed and filed fitted for less than $6.00. With the standard contour sawing technique, flame-cutting can obviously be brought into the picture. The table, Figure 7, definitely proves that, insofar as cutting rate is concerned, standard speed band sawing cannot compete with flame-cutting. Let's take the same material thickness, for example. The 14" cut could apparently be executed in slightly over one minute by flame-cutting, whereas it takes 40 minutes by band sawing. However, it will also be noted that a ⅞" thickness of carbon steel can be friction sawed as fast as it can be flame-cut. The table also shows that a 6" material thickness can most efficiently be flame-cut and this is by no means the maximum, but 1" is considered a most practical friction sawing thickness limitation as applied to general shop practice.

The fact remains that a flame-cut die must necessarily be precision machined by conventional procedure, thus making its cost of production two and three times higher than by contour sawing. On the other hand, when it is a matter of high cutting rate only, flame-cutting does have the advantage over friction sawing on the thicker materials but is no match for thicknesses of ¾" or under, as the tabulated figures indicate.

Generally speaking, friction sawing does not apply to tool work, although there are a few applications in connection thereto; but they are rarely executed by the tool or die maker. A typical production friction sawing job is shown in Figure 8. In this particular case, the cutting rate is 22 lineal inches per minute as compared to an actual sawing rate of 2⅝" on the ½" armor plate which is the material involved.

(CONTINUED ON PAGE 148)

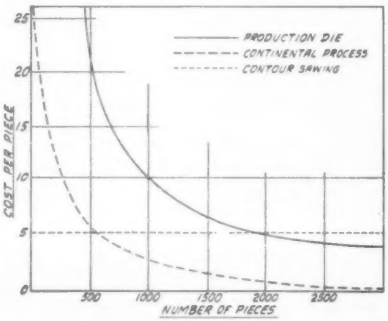


Fig. 12. Graph showing comparative costs per piece by three methods of producing stampings.

Production Up, Down-Time Down

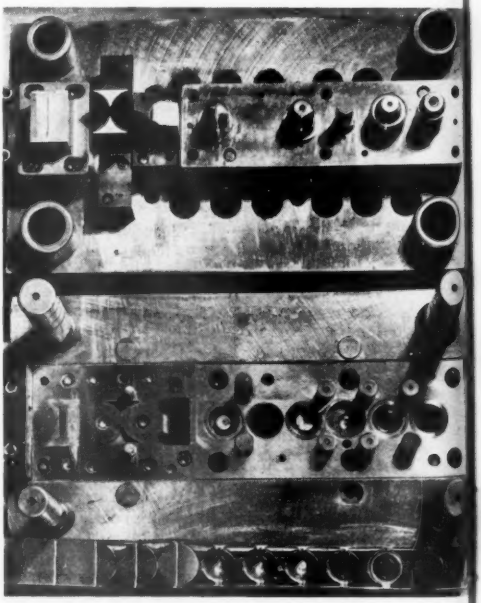
A nine-station progressive die with carbide applied to two severe operations, the first draw and final cut-off. Performance: 5,000,000 draws without maintenance; 2,000,000 cut-offs between grinds.

The use of carbides for the cut-out and cupping die portions of a 9-stage progressive die has enabled Thompson Products Company, Detroit, to increase the length of runs on rod bearings for the socket tie rod assemblies produced for automotive vehicles from 200,000 to 2,000,000 before the dies require reconditioning. Actually even longer runs could be achieved before the carbide dies become dull.

In the original progressive die used to produce these bearing cups, the most critical stages were (1st) the cut-out and (2nd) the cupping dies. All dies and punches were of die steel. After about 200,000 pieces were run, they found it became necessary to shut the press down for die overhaul due to loading up of the cut-out die. This required about two hours, during which time the press was idle. After some three sharpenings, the cut-out die had to be replaced.

To eliminate this bottleneck, Thompson first installed a cut-out die of Carboloy cemented carbide. Later, it replaced the high speed steel forming die in the fourth station with carbide as well. Both cut-out and forming dies, Figure 4, are of exactly the same design as were the high speed steel dies they replaced; and the same lubricant and press speed (105 strokes per minute) are used as before. The die steel punches were retained.

Fig. 1-A. Punch and die members of the progressive nine-station die used by Thompson Products, Detroit, in producing bearings for socket tie rod assemblies. The embossing punch at the left impresses the bearing oil groove across the strip as the first operation.



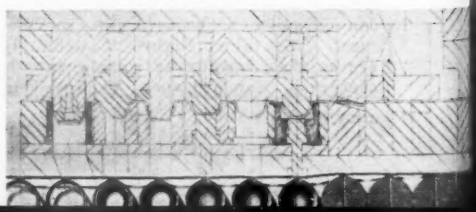


Fig. 1-B. Cross-section through the punch and die assemblies of Fig. 1-A with sample workpiece showing progression of operations from right to left. The stock is given its first forming operation by the Carboloy die at the fourth station; and the piece is cut out at the ninth station, Carboloy cutting-out die.

Fig. 2. These tie rod bearings for socket tie rod assemblies are produced in the nine-station progressive die. They are made from cold drawn SAE 1010 stock, .075" thick.

According to the company, after more than a year's experience with the carbide cutting-out and forming dies, it is now their practice to remove the die block after each 2,000,000 operations to sharpen the cutting-out die. Thompson Products reports that up to now (the 2,000,000 mark) the carbide cutting-out die is not yet dulled. However, it has found that, unlike a steel cutting-out die which becomes progressively duller and duller, the carbide cutting-out die, when it does become dull, does so with comparative suddenness. Therefore, to prevent dulling, the carbide die is re-sharpened periodically before it begins to lose its initial keenness. This procedure, they have determined, is giving them an even longer total service life for the die. For that length of run, the company's experience indicates that they would have needed seven steel cut-out dies.

Similarly, the carbide forming die to date has performed over 5,000,000 operations, without requiring polishing.

Thus, at a conservative estimate, 44 hours of maintenance time have also been saved on this particular press tooling for the year's run of 5,000,000 tie rod bearings through the use of carbide cutting-out and forming dies. Thompson Products figures that this is equivalent to an added production of some 315,000 pieces.

The complete die set is shown in Figure 1-A as well as a work strip showing the operation performed at each stage. At the first station an oil groove is formed. The stock is then successively blanked, given a glancing blow to separate the discs, and then given its first forming draw in a Carboloy die. The fifth station in this particular setup is primarily for locating. At the sixth station, the part receives the final draw, the bottom of the cup being re-struck.

The center hole is then pierced in the seventh stage, and the piece receives a re-striking blow at the eighth station. The ninth station is the Carboloy cut-out die. The material is cold drawn SAE

Fig. 3. Showing the punch and die assemblies setup in the 50-ton Henry and Wright Dieing Machine on which the job is run. The press is operated at an average speed of 105 strokes per minute. Drawing compound is ratchet-fed onto the stock as the strip enters the die from the right.

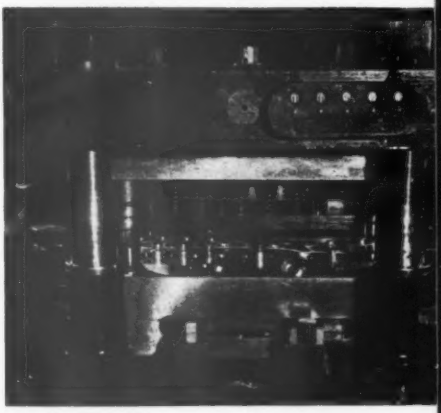


Fig. 4. (Left). The Carboloy forming die, fourth station, during the year in which it has been in service has performed more than 5,000,000 drawing operations and has not yet required maintenance. (Right). The ninth station, Carboloy cutting-out die is reground every 2,000,000 operations. The steel cutting-out dies formerly used had a life between grinds of only 200,000 operations. They could be resharpened only three times and then were scrapped.

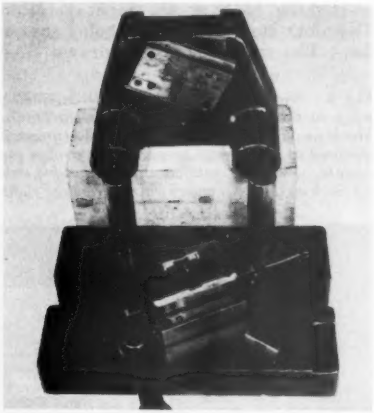
1010 stock, .075" thick, Figure 2. The operation is performed, as shown in Figure 3, in a 50-ton Henry and Wright Dieing Machine. An ordinary drawing compound is ratchet-fed onto the strip stock as it enters the die.

In addition to the 10-fold increase in life of dies between grinds and the even greater increase in forming and blanking die service, the company reports that the carbide forming die gives a better surface finish than did the former dies. However, surface finish is not considered so important in this instance, since the tie rod bearings are finally finished by coining.

Carbide Inserts Eliminate Die Servicing

The sizing and forming die, illustrated in Figure 1, is used by the Underwood Corporation, Bridgeport, Connecticut, in producing small steel links.

The links are made from SAE 1010 cold drawn wire of .0695" diameter, cut to length and bent at the ends.



The operation consists of sizing two hubs and swaging the top of the link to final form, as shown by Figure 3. Portions, A, of each end of the links are flattened, the diameters of the hubs, B, are held to .071"-.072", and the center-to-center distance is held constant.

Two Carboloy bushings, of .071" ID, are mounted in the hardened steel bottom die, Figure 4. The preformed wire is placed on the lower die and is formed by the pressure exerted by the plain upper member. The pins, C, are of a slip fit in the bushing holes and serve both for the hubs, B, to bottom on for length, and to eject the finished piece from the die by means of the cams, C, which are actuated by the hand lever and spring shown in Figure 1.

The steel bushings formerly used had to be replaced after an average of 15,000 operations. Since installation of the Carboloy inserts, about 30,000 pieces have been run, and with no detectable signs of wear, it is estimated that a million pieces can be produced before the die will require servicing.

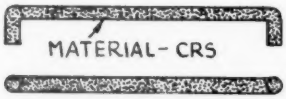


FIG. 2

FIG. 3

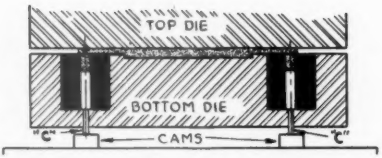
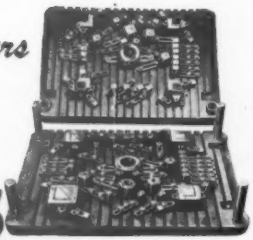


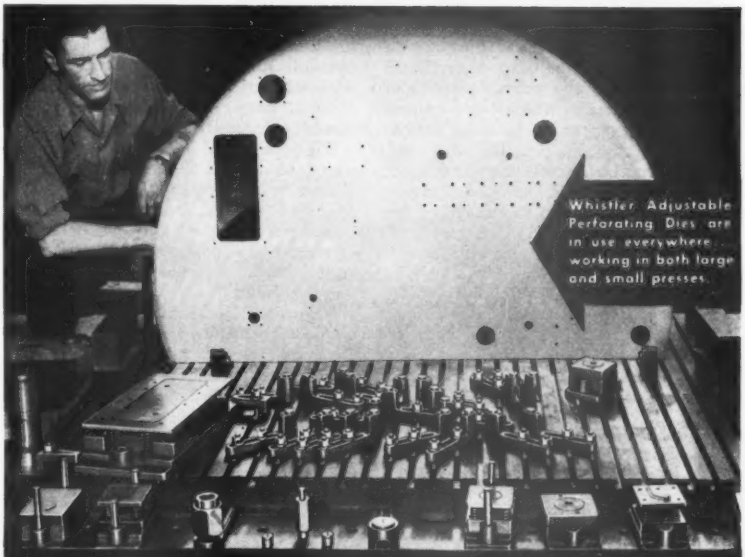
FIG. 4

TOP VIEW - BOTTOM DIE

Get into Production in a few hours with

WHISTLER ADJUSTABLE DIES





There are plenty of other advantages in using Whistler Adjustable Dies. It makes sense to get the complete story. And it's easy to do. Write for your Whistler Catalogs today.

Whistler perforating dies now offer a double-barreled advantage in getting into production faster. Standard sizes of round hole punches and dies . . 1/32 to 3" . . can be shipped promptly. Special shapes . . squares, ovals, rectangles, group and notching dies, are quickly made to order.

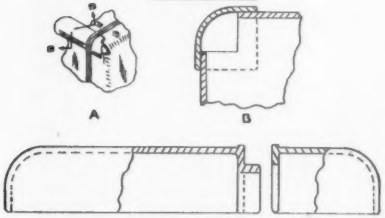
Equally important, set-ups are simple . . take only a short time. Same units can be rearranged or units added in setting up different jobs. Production is thus speeded while die costs are amortized through continued re-use.

No special tools are needed. All parts are interchangeable. The heavy duty series of punches and dies easily pierce materials up to 1/4" mild steel.

Temporary Tooling For Metal Luggage

The attempt to fabricate luggage of magnesium sheet posed several problems which were due to the characteristics of that metal, and some which were caused by the limited production planned. Drawing the sheet, though possible, was considered impractical, since hardened sheet was required to overcome the denting found to be a major fault in the luggage which had been produced from aluminum for some years. Heated drawing has been found practical in magnesium applications of comparable size, but this would have necessitated the use of heavier gauge sheet than desired and would have been prohibitive in cost, since production was planned in a range of sizes of limited volume each. In addition, a finished, matching edge was required and could not be formed from this metal which, in the hardened condition, requires a bend radius at normal temperatures of twelve or more times sheet thickness and five or more times at temperatures approaching 400° F.

FIGURE #1.



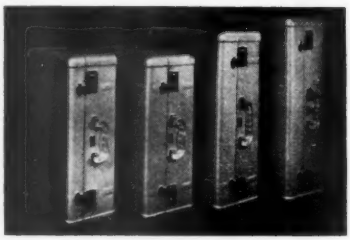
CORNER DETAIL--- A-VIEW AT CORNER SHOWING CASTING APPLIED TO SHEET --B-VIEW AT BB ---- C-MALE CASTING D-FEMALE CASTING

These considerations made it necessary to design the product in such a manner that brake equipment could be utilized. The design had to be such that over-all dimensions could vary readily without seriously affecting the tooling, since a range of as many as ten sizes would eventually be required.

Figures 1 and 3 show how the corner was folded from the flat, leaving an open corner covered by the castings, C and D. The flat pattern from which this shape was developed is shown in Figure 3. To eliminate the danger of sheet cracks, a radius of ¾" was used on a sheet thickness of .045".

Figure 2 shows how a pair of extrusions, attached to the sheet between the castings, served to make the mating edge and to carry out the line formed by the castings.

Since the production volume was not to be great, a method for producing the blanks without blanking dies was required. A squaring shear was altered to insure a true 90° angle of cut and stops adjustable in $\frac{1}{64}$" steps were incorporated. Care was taken to trim all four



by A. H. Blacker
President
Mag Products Corporation
Cleveland, Ohio

"THE TREND IS TO SHEET METAL"

The ... metal s... ant eye-appe... models, forecasts incr... sideration to this type of produc-tion — reveals a recent survey.

GEMCO

. . . . this means stampings and stampings mean

It's ... Lu... Pro...

GEMCO SHAPER

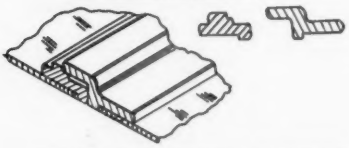
. . . for GREATER PROFITS from PRECISION DIE WORK

A new tooling period has begun. The trend in new production to the increased use of metal stampings means DIES! Cost-reducing equipment like the GEMCO Universal Shaper for precision die work, guarantees faster production and increased profits. This Shaper features a Revolving Table with a Tilting Top which particularly adapts it to economical machining of a wide variety of angular and compound angular work as well as a variable of flat work. The exclusive GEMCO Lubrigard Device, which automatically shuts off the machine should any defect occur in the lubricating system, is an added feature and attests to GEMCO superior engineering. Available in 16-in. to 36-in. stroke lengths. Optional equipment includes Front Table Support and Power Rapid Traverse to Table. For further details—

WRITE TODAY FOR BULLETIN GC-13D

sides of the blank. As many as a hundred pieces an hour have been blanked with this method, while conversion to other sizes requires only one or two minutes.

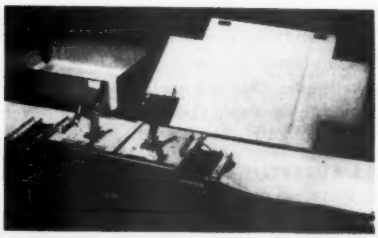
FIGURE # 2.



DETAIL OF EXTRUSION AS ATTACHED TO SHEET

The patterns of holes by which the corner castings are attached would have required a minimum of three punching dies or removable punches in a die arranged for three locating positions, since three sizes of castings were to be used. Setup time for such an operation would have been considerable and it was felt that drilling would be practical if the sheets were stacked. Three drill jigs were designed, each having a pattern of four holes, Figure 3, upper right. The blanks were inserted in stacks of ten and drilled in four positions with an electric drill suspended from a radial arm. Also, the four holes which matched those in the locks, later to be applied, were incorporated in this jig. Since setup time was eliminated and since production was more than ample for the requirements, it proved satisfactory.

Fig. 3. The flat pattern from which the formed shape at the left was developed. The magnesium sheet, after notching and perforating, is clamped under and rolled around a radius bar. Removable gage pins allow forming both the shallow lid and deep body of each model with one forming setup.



A right angle shearing punch was made to remove the square blank from each corner and adjustable stops incorporated to punch the three sizes required.

Small bench presses were set up to punch the rectangular lock clearance holes, Figure 3, locating from two of the four holes mentioned above. The same was done for the pair of small rectangular slots required for the handle loop straps. It was found that both of these punching operations could be performed by foot power without undue operative strain.

The transverse ribbing, as seen on the side of the finished product, was desired both for its stiffening effect and for design value. This had to be drawn into the sheet, since the utilization of the extruded strip would not allow this shape to run to the sheet edge; and the requirement of as large a bend radius as possible had to be met to eliminate cracking. A crimping roll which incorporated one fixed and one adjustable arbor was fitted with male and female forming rolls, the male roll being brought down into the female after the sheet was inserted between. This operation proved to be both rapid and readily controllable after the shape of the forming rolls was determined by trial.

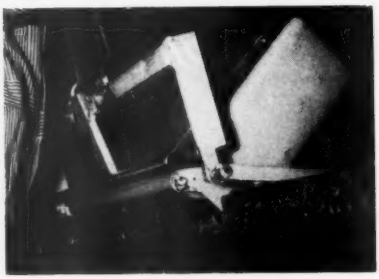


Fig. 4. The bending characteristics of the magnesium sheet were such that in order to develop a ¾" radius the radius bar had to be of 1 1/16" diameter. Due to the bending pressure required it was necessary to support the longer forming roll at its midpoint by the welded-on back rest.

STOP
Ever alert to the safety needs of resinoid portable snagging, Bay State produces cup wheels with "built in" safety features. The especially designed nut is molded in the wheel by a patented Bay State manufacturing process. (Pat. No. 2,172,243) . . . a safety precaution against the nut breaking loose. A reinforcing ring inserted in the base is an additional safety feature.
In addition to portable snagging wheels, Bay State is equipped to supply all sizes and shapes of vitrified and resinoid bonded snagging wheels, discs and mounted points, as well as resinoid, rubber and Bayflex cutting off wheels.
Branch Offices & Warehouses—Detroit—Chicago
Distributors — All principal cities
BAY STATE
Top Performance Consistently Duplicated
BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

A BUYING GUIDE FOR ABRASIVES

POINT No. 7

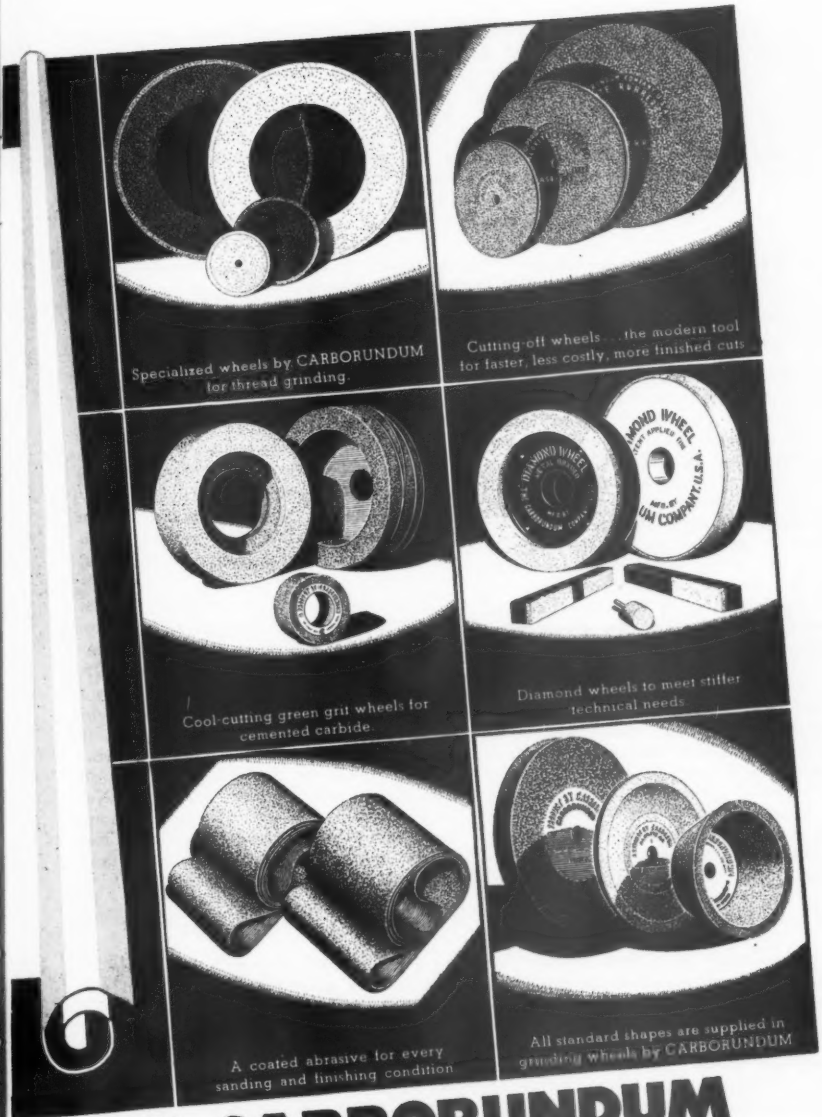
SATISFIED USERS

When satisfied customers are the yardstick by which a concern is evaluated, The Carborundum Company measures up well. During the many years it has supplied abrasive tools to industry... the opinions, needs and viewpoints of those it serves have been deeply respected. The results of this policy are reflected in the high regard in which the name CARBORUNDUM is held by users of abrasives.

There's a certain feeling of satisfaction in doing business with a concern on this high level of helpful cooperation. It is often expressed in the stated preference for services and abrasive products by CARBORUNDUM. The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM

A Good Rule for Good Grinding


Specialized wheels by CARBORUNDUM for thread grinding.
Cutting-off wheels . . . the modern tool for faster, less costly, more finished cuts
Cool-cutting green grit wheels for cemented carbide.
Diamond wheels to meet stiffer technical needs
A coated abrasive for every sanding and finishing condition
All standard shapes are supplied in grinding wheels by CARBORUNDUM

. . . CALL IN **CARBORUNDUM** TRADE MARK

● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS

It had been intended to make the right angle bends, shown in Figures 3 and 4, on a press brake, but this proved impractical due to the irregularity of the radius procured, a factor of the great amount of springback (in excess of 30°) experienced with the hardened sheet. Bottoming of the brake die was unsatisfactory because it either marred or cracked the sheet and it would have been necessary to heat the dies for best results. Also, forming by box brake was eliminated because of the springback and the marring effect. Had the volume required warranted the expense, either of these methods would have proved satisfactory with proper heating, but the roll forming device shown in Figures 3 and 4 was developed for experiment and proved satisfactory for production.

In this method, the sheet is retained under a radius bar by a pair of toggle clamps and is rolled around this bar by a forming bar hinged on a centerline common with the radius bar and free to revolve about its own center. To develop a ¾" radius, it was found necessary to use a radius bar 1 1/16" in diameter, while the forming bar size was not critical. A considerably greater pressure than expected is developed and it was found necessary to support the forming bar at its midpoint in order to retain the radius through the length of the bend. Due to the bending clearances required because of the springback, as apparent in Figure 4, it was necessary to duplicate this device for each model size, the length of the radius bar being equal to

(CONTINUED ON PAGE 106C)

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Editor's Note: Because the product design and material-working described in the foregoing article by Mr. Blacker seemed to present a logical project for press brake production, we requested the engineering department of the Cincinnati Shaper Company, manufacturer of Press Brakes, to comment on the press brake tooling that would be logical for this job. Their comments, referring to Figure 5, follow:

"In reference to manufacturing the airplane baggage from magnesium sheet, we cannot be too precise about exact methods without having working drawings of each of the different sizes to be made. However, we assume groups of holes and the necessity of the changes of length which seems likely.

"The various punching units in the die station No. 1 (Figure 5, Ed.) would be arranged so that the distance across could be adjusted to take care of the different types of cases. In like manner adjustments of the dies in stations No. 2 and No. 3 would take care of variations in lengths.

"Dies in station No. 4 would form the four sides using four operations. The male die would be slit so as to clear flanges already formed. It is likely that four different male dies would be used, one for each case. In this way the die would have sufficient length for forming the longer side and would be slit so as to form the shorter side. We have found that quite a little slit in a male die can be used without showing any markings on the sheet where it bridges this when forming the long operation.

"The lower views show cross-sections of the various dies.

"The rockers in the form die station No. 4 distribute the pressure over sufficient area to avoid marking the material to a noticeable degree.

"This setup could be operated several ways. If speed is not essential, one man might handle the sheets across the machine from operation to operation. Or, two men might be used; one for forming the four notching hits and the other to form the four forming hits. Again, if the production becomes larger, the forming die could be doubled in length, so that a man could be used at station No. 1, a second man would cover stations No. 2 and 3, and a third man station No. 4. In this way a part would be formed in each two strokes of the machine."

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

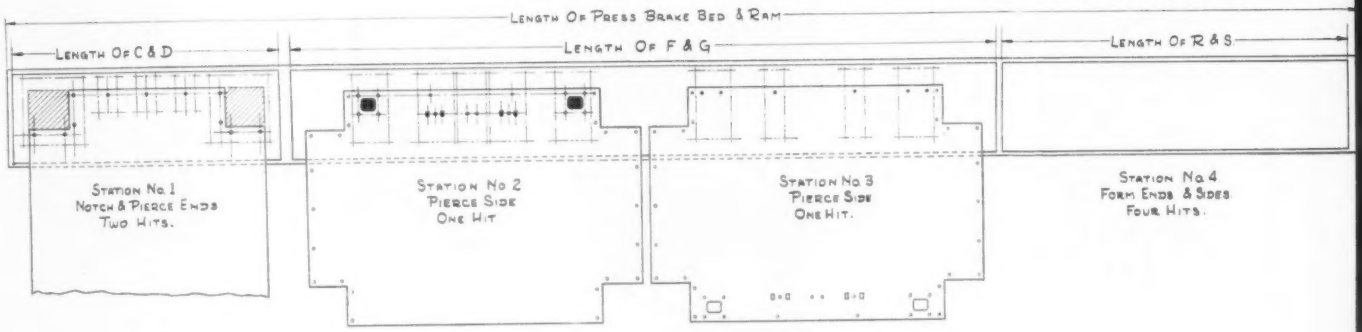
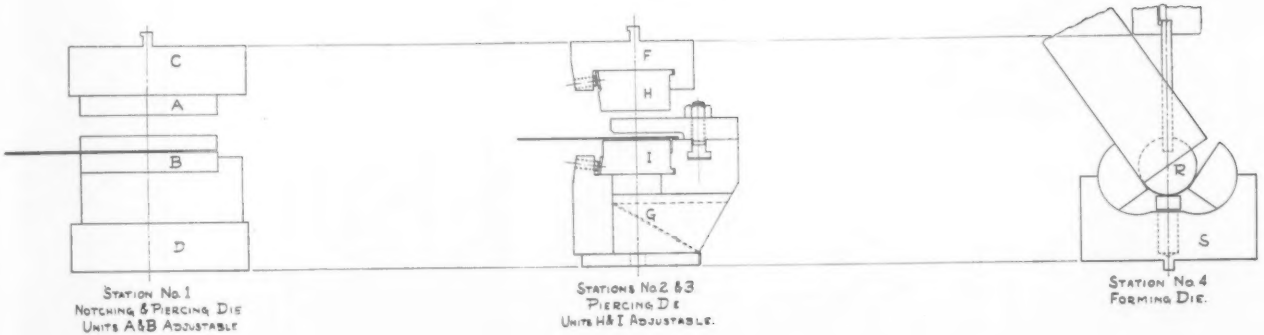

Length Of Press Brake Bed & Ram
Length Of C & D
Length Of F & G
Length Of R & S
Station No. 1
Notch & Pierce Ends
Two Hits.
Station No. 2
Pierce Side
One Hit
Station No. 3
Pierce Side
One Hit.
Station No. 4
Form Ends & Sides
Four Hits.

FIGURE 5


C
A
B
D
F
H
I
G
R
S
Station No. 1
Notching & Piercing Die
Units A&B Adjustable
Stations No. 2 & 3
Piercing Die
Units H & I Adjustable.
Station No. 4
Forming Die.

MOTO-TOOL No. 2 WITH EMERY POINT

$16.50

27,000 R.P.M.

DREMEL'S Improved MOTO-TOOL . . . the little electric grinder that does big jobs . . . can save you hours, by speeding up work now being done by hand. Invaluable for sharpening taps, drills, gauges, chisels, tools and cutters (without tearing down "set-ups"). Dremel Moto-Tool is a "war veteran" . . . used by all branches of the Armed Forces in far-flung repair bases . . . helped to set production records at General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Northrup, Douglas and other plants.

Look for These MOTO-TOOL Features

● Housing has "pencil-type" finger grip ● Instant-action, wrenchless chuck ● Oil-less, sealed, trouble-proof bearings ● Patented automatic chuck lock pin ● Oversize armature shaft, hardened, ground and polished ● 110 volt, universal type motor ● Easily replaced commutator brushes ● Sliding snap type switch ● Handy hanger hook ● Cord protector ● Sturdy, shock-proof bakelite housing ● Dust-filtered air cooling system ● Weighs only 13 oz. . . . shaped to fit the hand ● Dynamically balanced for vibrationless operation.

MOTO-TOOL KIT No. 2 WITH 23 ACCESSORIES

$23.50

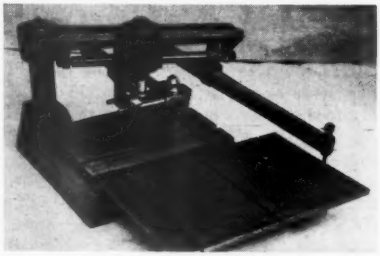
MOTO-TOOL KIT NO. 2, with 23 accessories (high speed steel cutters, grinding wheels, polishing accessories) and heavy-duty professional Model 2 Moto-Tool in natural finish, hardwood case.....$23.50. (Items purchased separately would cost about $30.00; you save $6.50.)

See your mill supply dealer. If he does not handle Moto-Tool, write the factory

New Controlled Cut 3-Dimensional Miller

Designed for fast, efficient contour milling, accurate profiling and 3-dimensional engraving, the new Philbro Controlled Cut 3-Dimensional Miller reproduces from an enlarged master. To mill parts to a certain shape or contour, a master template or model is made of brass, steel, plastic, wood or plaster to the same proportionate contours and the master template or model is then traced with the stylus.

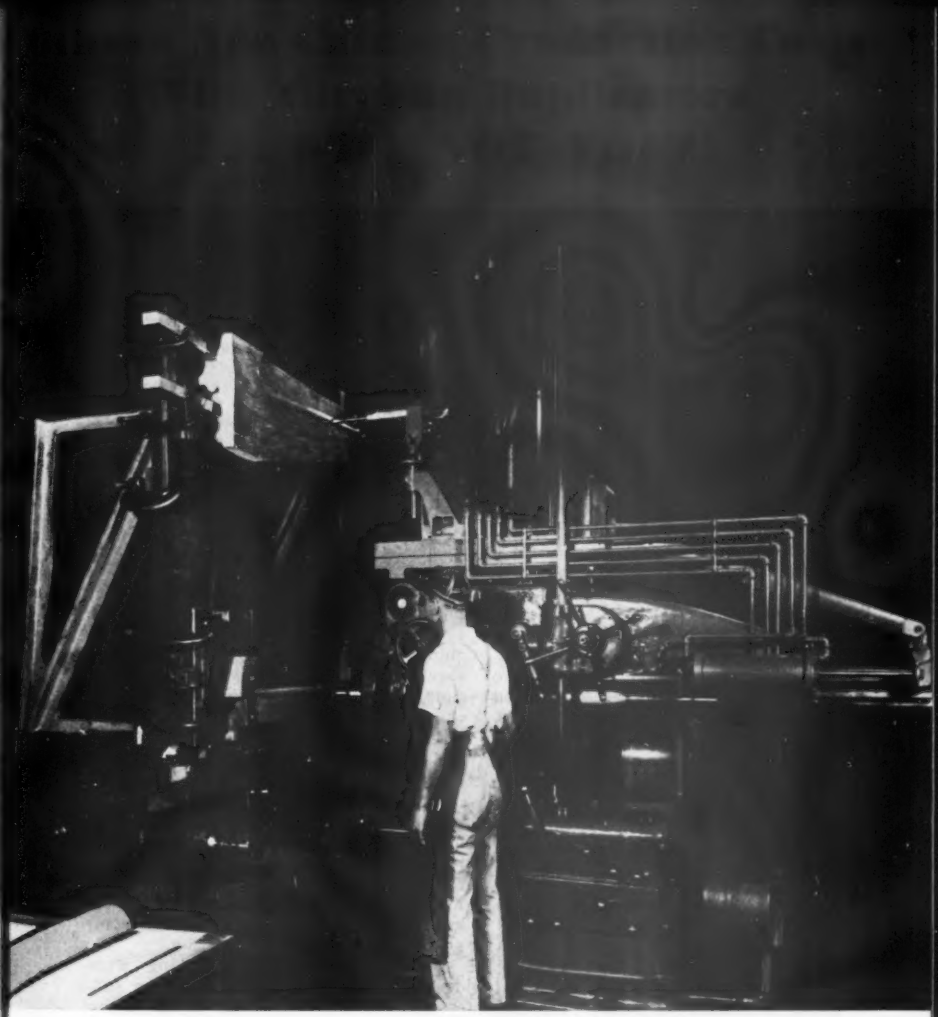
It is easily operated by following the contours of the master templates with a stylus arm controlled by one of the operator's hands. A hand controlled vertical feed to ½" is particularly advantageous in two-dimensional engraving and production profiling.



Its uses include making small blanking dies, templates, molds for plastics, glass or die casting or other forming operations of a similar nature; production milling and profiling various irregular slots, contours, etc., on parts of machines or instruments; three-dimensional milling of practically any shape required, by merely reproducing the reduced shape of a model or pattern; and for all standard two- and three-dimensional engraving.

Reductions are obtained by a pantograph mechanism set at the desired ratio; graduations show the adjustment required for obtaining any reductions within the 2:1 and 4:1 range. Roughing cuts can be taken with standard ¼" Shank End Mills but for finishing operations, single-flute engraving cutters and a supplied taper sleeve may be used.

Get other data from Philbro Tool & Die Co., Dept. 33, 1741 Broadway, New York 19, N. Y., or use INFORM-A-GRAM Key No. L33-Z.



Converts any milling machine, lathe, shaper, grinder, planer or boring mill into a double-duty machine without interfering with the ordinary use of the machine. *Send part or blueprint for our recommendation.*

Turchan

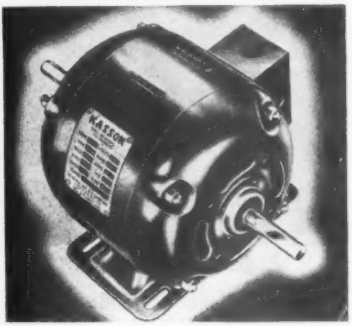
TURCHAN FOLLOWER MACHINE CO.
8257 Livernois • Detroit 4, Mich.

FOLLOWER MACHINE

Press Tooling And Production Of Electric Motors

It is news when a company whose background is in the tool and die field swings into the manufacture of electric motors; and double barrelled news when it comes up with a radically different design previously considered impossible by leading skeptics. Nevertheless, General Die and Stamping Company's 50,000th "KASSON Rotomotor," the first all-steel fabricated fractional horsepower induction-run electric motor ever built, has recently come off the line.

Conceived during the war, these KASSON ball bearing motors have been proved in the field for over two years.



by Ronald Brennan and Walter J. Zimmerman

General Die and Stamping Company

New York 12, N. Y.

They are giving an admirable performance, living up to expectations under all types of conditions, and not a single failure has occurred traceable to the use of pressed-steel end housings.

The advantages of such an all-steel induction motor were manifold. Pressed-steel end housings will not warp or crack, are extremely compact, and offer more horsepower per pound over the time-honored, bulky and laboriously machined castings. The weight-saving feature alone, for example, was an important practical design consideration because it reduces transportation and handling costs. Again, as a machine tool and die and stamping house, the company had the facilities and engineering know-how to design and build in its own shop the forty-odd basic dies and the many special machines necessary for production.

The desirability of making the KASSON motor completely from steel was thus established. How to accomplish it was the $64.00 question.

Four designs for the housing were developed and rejected in wearying succession before the basic engineering problems were overcome, i.e., rigidity and the elimination of resonance. Also, the design of the die must permit stampings to be held to tenths at the bearing surfaces, for it was agreed that to maintain maximum manufacturing efficiency, machining should be kept to a minimum. This was accomplished by re-sizing the pierced hole with a hard chrome plated sizing punch lapped to a high polish to minimize wear at this point.

The severe deformation of metal at

5 MILLION
ROD BEARINGS

formed with CARBOLOY Sheet Metal Blanking and Forming Dies

...WITHOUT REFINISHING

...AND STILL GOING STRONG

Saved cost of 7 Steel Cut-Out Dies, plus 44 maintenance hours, reports Thompson Products Company, Detroit

. . . and still practically as good as new", added Thompson Products Company. After forming 5,000,000 rod bearings with Carboloy Sheet Metal Dies, the record showed that to produce the same number of pieces, 7 steel cut-out dies would have been necessary. This saving also eliminated 44 hours in die maintenance time, resulting in 315,000 *additional* pieces produced.

Now consider these other Carboloy Cemented Carbide benefits: Closer tolerance on drawn parts —fewer "rejects"—lower cost per piece—virtually mirror-smooth finish, often with reductions in buffing time—and sizeable increases in output-per-press. You get more money, more production and less costs with CARBOLOY Sheet Metal Dies.

Carboloy Company Inc., 11125 E. Eight Mile Road, Detroit 32, Michigan.

START THE BALL ROLLING TODAY—WRITE FOR BOOKLET D-120

CARBOLOY® CEMENTED CARBIDE

SHEET METAL DRAWING AND BLANKING DIES

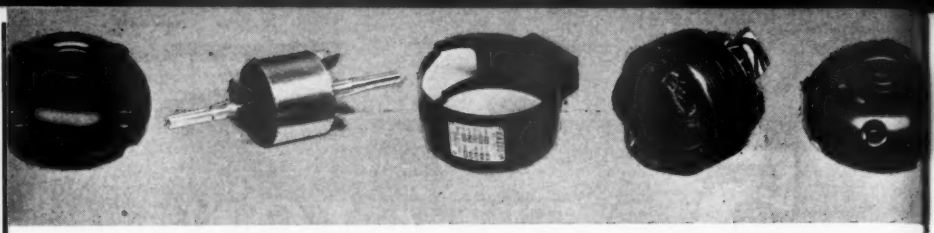


Fig. 1. Component assemblies of the KASSON electric motor: pressed steel end housings; rotor, shaft, starting switch and ventilating vanes; center band with punched louvers and terminal box; and stator assembly.

four points to provide the "bosses" for seating the ends of the stud bolts posed a neat technical problem. Each boss involves a section profile of compound curvature, and the working of so much heavy gauge metal in a small area had to be achieved without distorting the end plate. This was solved by making a slow draw on a specially designed hydraulic press. *The net result is that only one machining operation is required on the end housing;* a simple trimming operation requiring no particular skill on the part of the machine operator.

In the first operation the housing is drawn and pierced as shown in the accompanying illustration. In the second, the bearing diameter is sized and the reinforcing land squared up. The next operation pierces the ventilating slots and stud holes in the stud bosses, after which the housing gets its only machining operation, that of trimming.

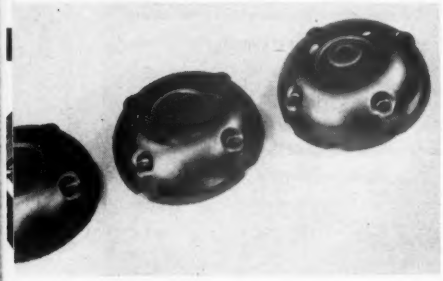
The bearing cap is next riveted on to the housing in a special jig to position it accurately in relation to the other. The ventilating baffles are then spot welded inside the housing, after which there is a thorough check for alignment and concentricity. The percentage of rejects at this point is practically zero.

A new principle of ventilation called "Dual Flow" is employed in the KASSON motor and is an integral part of the housing design. The ventilating air is drawn from each end of the motor through the end housings, and exhausted at the center of motor through the radial louvers on the band. This band, incidentally, is of light gauge steel rolled from a flat, with a lock-seam joint. The "Dual Flow" ventilating principle increases the volume of cooling air passing over the stator frame, thereby reducing the temperature rise.

To carry through with the most modern trend in ball bearings for electric motors it was decided to standardize on the double, sealed-for-life, type. The choice proved to be a wise one, as most bearing failures are due to lack of attention or, contrariwise, overloading with unsuitable grease.

The base of the KASSON motor is unusual in that it is a one-piece stamp-

Fig. 2. Three stages in the manufacture of the pressed steel end housings. Left, drawn and pierced; center, bearing diameter sized, reinforcing land squared-up, ventilating slots and stud holes pierced; right, bearing and bearing retaining cap assembled and riveted.



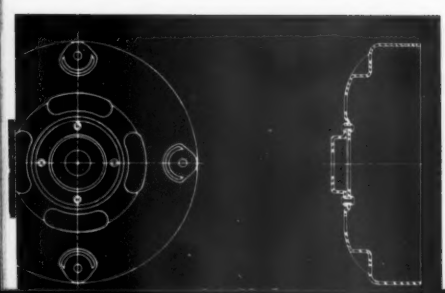


Fig. 3. Cross-section showing design of motor end housing and bearing cap assembly. Note the severity of the draw in forming the mounting bosses. Each boss involves the compound curvature of a relatively small area of heavy gauge stock.

Adapt Any Milling Machine For Rotary Milling And Indexing Work In A Few Minutes

with

KNIGHT'S 20" ROTARY TABLE

- Use it on any milling machine, horizontal boring mill or work bench
- Virtually eliminates all set-up time
- No installation — just plug it into nearest electric outlet
- Geared down motor provides ample power
- No other equipment or connections necessary
- May also be used as automatic revolving fixture

SEE IT IN OPERATION!

1947 MACHINE TOOL SHOW CHICAGO SEPT 17-26

SEND FOR COMPLETE INFORMATION TODAY

W. B. KNIGHT MACHINERY COMPANY

KNIGHT VERSATILE MILLERS ACCURATE RIGID

MORE GOODS for MORE PEOPLE at LOWER COST

3920 WEST PINE BLVD. • ST. LOUIS 8, MISSOURI

Fig. 4. On this specially built, K. R. Wilson hydraulic press is performed the first drawing and piercing operation for the pressed steel end housings.

ing which is bolted to the motor and permits versatility in various mounting applications.

The lamination die, while a more conventional part of any motor tooling program, is nevertheless the most elaborate and costly of them all. There can be no room for failure here.

The stator laminations are produced on Bliss high production presses from coiled steel strip, the die being a four-stage one as shown. Complete stator

(CONTINUED ON PAGE 106F)

Fig. 5. The four-stage lamination die that produces the rotor and stator blanks. These are run on Bliss high production presses from coiled steel strip. Each stroke of the press produces one rotor and stator blank. Each stage of the die is one piece; no sections. The third-stage punch is of 36 separate pieces held in position with Cerro-matrix.

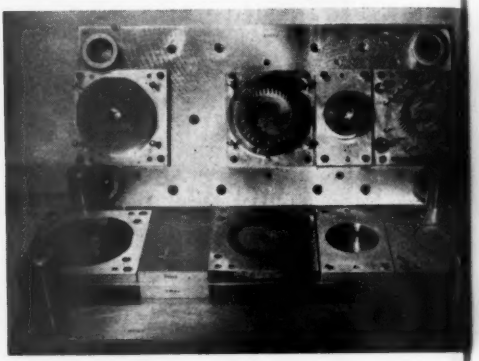


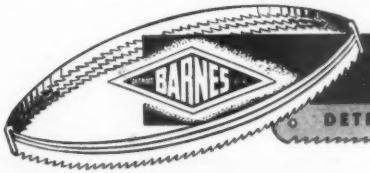
Fig. 6. This K. R. Wilson hydraulic press is specially tooled for assembly of the stator laminations. A stack of laminations, of prescribed weight and "loaded" with eight rivets, is positioned under the ram. After application of 30 ton stack pressure, the built-in hydraulic riveting guns head-up the rivets and the stator is ready for winding.

for ANY SHAPE
. . . ANY CONTOUR
ANY RADIUS
(INTERNAL, EXTERNAL)
CUT THEM ALL
EASIER, FASTER
with BARNES
ARC LINE
BAND SAWS

YOUR contour saw, irrespective of make, is one of the greatest money-saver machine tools developed in recent years. The work this machine is specially designed for—and particularly radius cutting—is most severe on the band saw blade. It is under such conditions that Barnes Arc-Line Band Saw Blades operating on your contour saw mark the important difference between ordinary performance and *maximum performance.* Correct tooth form, uniform set, proper hardness and temper built into all Barnes saws, plus experience gained through over a quarter century of manufacturing metal saws exclusively, assure you that *maximum performance.*

Call YOUR INDUSTRIAL DISTRIBUTOR for speedy delivery of Barnes Blades and other industrial products.

The Barnes industrial distributor near you has complete stocks of Arc-Line saws sturdily packaged in 100-ft. coils. Cut yourself a saw from one of these handy coils and prove to your satisfaction that Barnes Arc-Line delivers maximum performance all ways.



ESTABLISHED 1919

W. O. BARNES CO., INC.

DETROIT 14, MICHIGAN

Press Alignment Of Punches And Dies

Anti-Friction Die Sets and accessories offered to press operators by Lempco Products, Inc., makes it possible to obtain maximum die life and assurance against costly down time. Experience of users shows an increase in stampings between regrinds of up to 100% with 50% considered routine.

Perfect alignment of punches and dies is obtained through the preloaded anti-friction bearings between the leader pins and bushings which prevents any side play, and the complete absence of "clearance" between them prevents tilting of punch holders, thus resulting in precise parallelism of punch holder with the die holder.

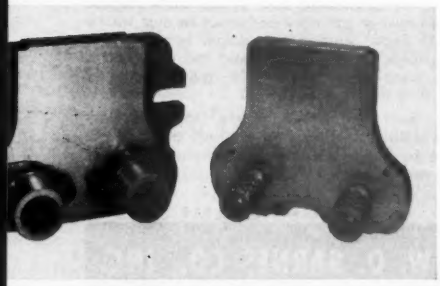
When Lempco Di-Ali-Ner and/or Ball Shank attachment are combined with the Lempco Anti-Friction Die Set, misalignment in all punch presses is remedied. A recent survey showed that 99% of punch press equipment was out of alignment; the most common fault being that the ram and bolster are out of parallel.

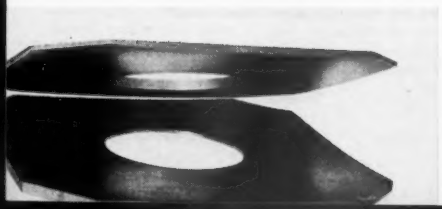
Lempco Di-Ali-Ners have been designed to eliminate misalignment due to out of parallelism between the ram face and the bolster, also to reduce the all important setup time. They are matched spherical plates, one concave, the other convex, and both have flat outside surfaces. The spherical radius is such that a correction of $\frac{1}{32}$" to $\frac{1}{16}$" can be expected. This range is due to the radii employed in the different sized plates, however an error of .025" is considered very serious in a punch press; consequently, a Di-Ali-Ner of any size can be depended upon to correct the worst error of misalignment.

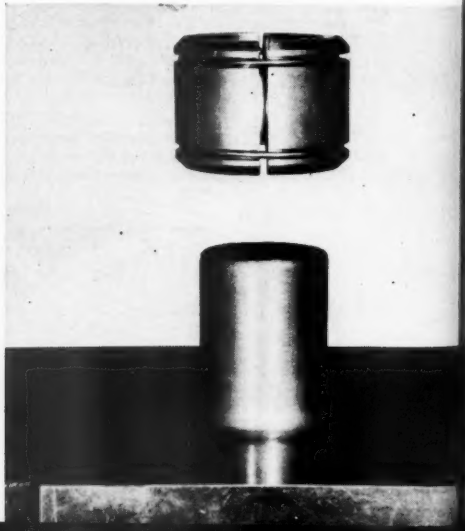
Lempco Ball Shank Joints were designed to eliminate misalignment between the die shank and the clamping hole in the ram of the press. The Ball Joint consists of a ball section and split sleeve bushing, both having identical radii.

The Ball Joint Shank is slipped on to the conventional shank (conventional shank must be turned down to a predetermined diameter). When the Ball

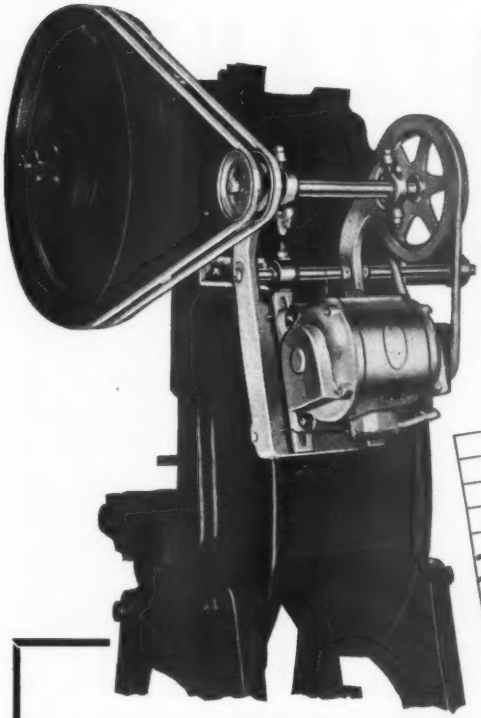
(CONTINUED ON PAGE 106G)



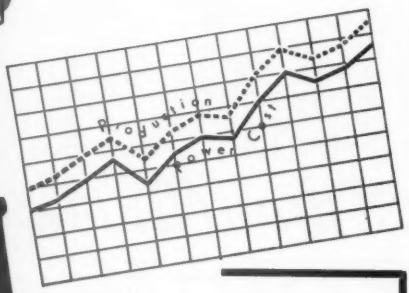




Only Producing Machines Consume Power



Modern Motor Drives



Deliver more horsepower to the job—

Smoothly—Silently—Efficiently—Economically

Eliminate costly interruption of production due to broken or worn out gears by installing MODERN "V" Belt Drives. *FULL* horsepower is delivered from driver to driven sheaves with a positive grip which becomes tighter with the loadweight.

MODERN MOTOR DRIVES utilize *standard* 1750 RPM motors! Drive shafts are equipped with "Triple Seal" Ball Bearings—no lubricating necessary.

There is a MODERN MOTOR DRIVE to fit practically any machine tool in your plant. This efficient Drive gives increased production at lower cost.

Write today for specifications and prices.

MODERN MOTOR DRIVES

Division of

The Nichols Engineering Company

2400 W. Madison Street Chicago 12, Illinois

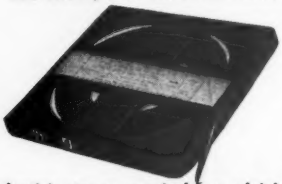
Specify ATLANTIC

BAND SAW BLADES

for Smoother

CONTOUR CUTTING

ATLANTIC SAWS meet all of your requirements for a superior blade on complicated die and fixture radius cutting. ATLANTIC specializes in accurate milled and precision set teeth, hardened to exact temper.



Atlantic's strong, practical box, plainly marked on sides and top. Remains in good condition until entire coil is used.

ATLANTIC'S special alloy steel insures longer wear and easier welding.

ATLANTIC'S one temper saw for all metals reduces stock you have to carry. Cut to length and welded, ready for use. Packed in strong Atlantic box. Write for new Atlantic Catalog.

Atlantic Saw Mfg. Co.

INCORPORATED

Exclusively Manufacturers of Band Saw Blades

160 Brewery St., New Haven, Conn.

Make Quick, Accurate Adjustment

WITH SCULLY-JONES ADJUSTABLE-ADAPTER-ASSEMBLIES

FAST and EASY as 1-2-3

1. Release set screw in the side of spindle.
2. Release screw in nut.
3. Shorten or lengthen projection by turning the nut.

SPINDLE EXTENSION ASSEMBLIES—Styles 1800 and 1900—Furnished with Morse Taper Holes and Acme Threads on the shanks.

TENSION AND COMPRESSION TAP HOLDERS—Styles "C" and "D"—Used on multiple spindle tapping heads to compensate for variations in lead of different taps.

In multiple spindle drilling and tapping, save time and money; eliminate trouble and delays; adjust drills and taps fast and easy as One, Two, Three.

Set-up is not disturbed. Accuracy is assured as spindle screw retains the adapter in position, and key furnishes the positive drive. These adapters are carefully heat-treated and ground to assure concentricity.

For complete information refer to page 38, and 64 through 78 of Scully-Jones Tool Engineering Manual 500, or write for details.

CHOICE OF TAPERS—Adjustable adapter assemblies are furnished with Morse Taper, "USE-'EM-UP" or Stub Taper Holes. Acme Threads or Standard "V" Threads on the shanks.

MOST STANDARD SIZES ARE CARRIED IN STOCK FOR

IMMEDIATE DELIVERY!

Are You Planning SPECIAL TOOLING? If so, please send your drawings and specifications early. Prompt quotations will be made and delivery dates can be met, thus preventing delays in your production schedules.

TYPICAL APPLICATION—of Scully-Jones Adjustable Adapter Type Assemblies. Close-up of work head and index table of a Special Multiple Spindle Machine, Manufactured by The Cross Co., Detroit, Mich.

Refer to the Scully-Jones Catalog showing over 500 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

Scully-Jones AND COMPANY

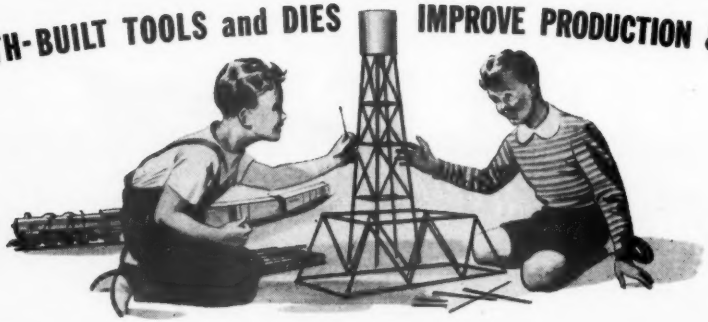
1913 SO. ROCKWELL ST., CHICAGO 8, U.S.A.

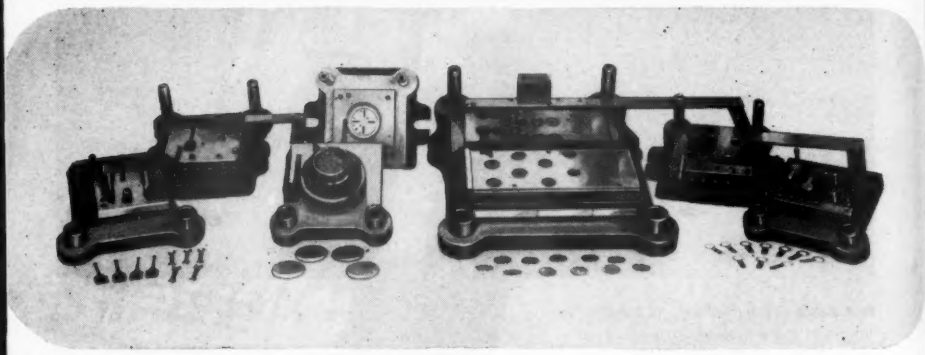
2403-TD

JULY, 1947

106A

BARTH-BUILT TOOLS and DIES IMPROVE PRODUCTION & PROFITS





Barth built these dies for a prominent toy manufacturer located on the Pacific coast.

TOY MAKERS WATCH COSTS, TOO!

THEY FACE COMPETITION . . . they know the price of leadership depends not only on the kind and design of toys they develop, but also on their cost figures.

Making toys better at lower cost . . . with greater economy in materials, time and labor . . . with greater "eye and buy" appeal, is a production problem which Barth-built tools and dies have solved for prominent toy manufacturers.

Exceptionally broad and versatile experience is available at the Barth organization including product engineering and designing . . . expert tool, die, jig, gauge and fixture craftsmen . . . plus an exceptionally complete plant capable of handling entire tooling or special machine programs of any size or magnitude. Write for catalogue.

BARTH STAMPING & MACHINE WORKS Inc.

Denison at W. 34th St., Cleveland 9, Ohio

DESIGNERS AND BUILDERS OF DIES, TOOLS AND SPECIAL MACHINERY

Temporary Tooling

(CONTINUED FROM PAGE 94)

the longer dimension of each piece of luggage. Removable gage pins allow the forming of both the shallow lid and the deep body of each model on the same machine.

In the assembly, tubular rivets were used throughout, though spotwelding would have been more satisfactory for the attachment of the extruded trim sections. Here again it was felt that the limited production did not warrant the expense and drill jigs were made to predrill the extrusion, the sheet being back drilled to match upon assembly. The corner castings are pre-drilled to match the hole pattern in the sheet, thus giving dimensional control and location as well as eliminating the need for assembly jigs and hand drilling operations.

Though this method of manufacture is admittedly neither as fast nor as accurate as either deep drawing or single step blanking, punching and forming, it has allowed production to begin much sooner than would have been possible with either of these methods; it will not require the amortization of expense for the large equipment required for these methods; and it has proved satisfactory for the unit volume desired.

"Pictures" Of Quality

A new service to customers has been announced by the Hunter Pressed Steel Company, Lansdale, Pa., manufacturer of precision springs. The company, having used for years statistical methods for the control of quality, sends each Hunter customer who desires it, a "QR" or Quality Report by mail immediately after final inspection of his order. This report is a copy of the final sampling Quality Report regularly made by Hunter inspectors. It is in the form of a frequency distribution of the test load values and consequently presents the information most needed in a manner most readily and easily understood. Installation of a new line of fast, accurate electronically-operated testing machines has made this system a practical service.

NP Automatic WATER EJECTOR

for Compressed Air Systems

● This water ejector *automatically* removes *collected* water from compressed air systems... eliminates messy, costly manual draining... cannot cause a loss of pressure because it never connects the compressed air system to atmosphere... prevents water damage to pneumatic equipment and production material... thousands in operation.

Write for Bulletin DC-25-A.

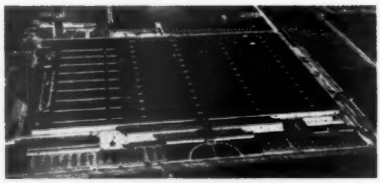
NATIONAL PNEUMATIC COMPANY
INDUSTRIAL SALES DIVISION
RAHWAY, NEW JERSEY

Pneumatic Specialists Since 1904

Machine Tool Show September 17-26

More than a thousand new machine tools, forging machines and other metal-working machinery will be demonstrated by over 250 leading manufacturers at the Machine Tool Show, September 17-26, at the Dodge-Chicago plant. An expected attendance of 100,000 will view the displays which will be operated over a twelve acre area.

"More Goods for More People at Lower Cost" is the theme of this show, the first in the past 12 years. It is to be considered as the guidepost to great industrial advancement.



Two hundred and twenty types of machine tools made in the United States, with additional variations and sizes of each type, and combinations of various types, plus featured special-purpose machines designed for mass production techniques, will be on display. Also forging machines, various other sorts of metal-working equipment, appliances and accessories will be open for inspection. All exhibits will be shown under actual working conditions in the Dodge-Chicago plant.

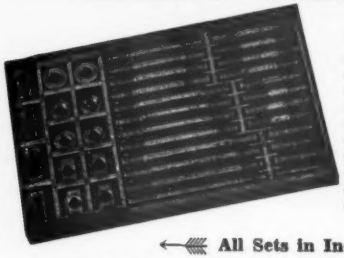
This event, the fourth to be presented by the National Machine Tool Builders' Association, will be concurrent with the Machine Tool Congress which will include nightly sessions at which will be given papers and discussions touching upon latest developments in the metal-working industry.

Illustrated literature describing the highlights of the Show, plus an advance registration blank may be requested from National Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6, Ohio.

Handy

SET-UP STUD AND NUT SET

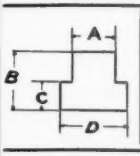
EVERY MACHINE IN YOUR PLANT NEEDS ONE ★ QUICKLY PAYS FOR ITSELF IN TIME SAVINGS



Each Set Consists of
4—3" Studs
4—5" Studs
4—7" Studs
4—Nuts
4—"T"-Slot Nuts
4—4" Studs
4—6" Studs
4—8" Studs
4—Washers
4—Coupling Nuts

All Sets in Individual Cases

Specially designed T-slot nut will prevent damage to table slots caused by ordinary nuts.



Holes & Thread	A	B	C	D
½"—13 THD.	.555	¾"	11/32"	⅜"
⅝"—11 THD.	.675	1⅛"	13/32"	1⅛"
¾"—10 THD.	.806	1⅜"	½"	1⅜"

Prices
½" Set, $22.00
⅝" Set, $24.00
¾" Set, $28.00

Made of Quality Steel, Case Hardened and Chrome-Plated for Long Life.
Class 3 Threads
Sets Sized to Provide Greater Rigidity in Clamping.

IMMEDIATE DELIVERY

NOBLE & STANTON, INC.
Manufacturers of Tools, Gages and Their Accessories
1002 BROADWAY • BEDFORD, OHIO

Detroit Stamping Expands Facilities

Specializing in medium and small stampings, dies and other products of interest to the metal-working industry, the Detroit Stamping Co., Detroit, Mich., is expanding its plant floor space by 60 percent through new construction.

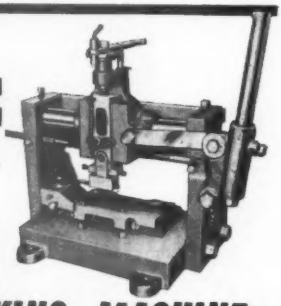
Besides increased working space around machinery which will be made possible through relocation of present equipment, the new section will permit installation of additional press equipment as well as a complete and distinct department for the manufacture of their long established line of finely finished refrigerator compressor valves. Other products are their De-Sta-Co quick-acting toggle clamps for holding parts in jigs and fixtures, arbor spacers, shims, blower fan housings, and metal washers and spacers.

New Press Plant

Builders of the Diebel Hi-Speed Automatic Punch Press, Di Machine Corporation, Chicago, Ill., has recently completed a new modern daylight factory to provide much needed additional space for increased production of their small press, and for the manufacture of tools, dies, stampings, and radio parts. It also has enlarged facilities for inspection of equipment and customers' convenience.

The Di Machine Corporation has plans underway for building a larger capacity, high speed press, similar in design to the present model except for increased tonnage and die space. Press design details will be announced soon.

for
ACCURATE
METAL MARKING
the
FORCE



E.P.1 MARKING MACHINE

AN inexpensive production machine especially adapted for marking on cylindrical pieces. Uses solid dies or dependable FORCE Interchangeable Steel Type which permits quick changing of the marking code.

There is a FORCE device for every metal-marking requirement. Send for free catalog of indenting and embossing numbering machines, steel stamps and dies, steel type and holders, hand and power presses, rotary marking machines, etc.

WM. A. FORCE & COMPANY
INCORPORATED
216 NICHOLS AVENUE, BROOKLYN 8, NEW YORK, U.S.A.

Press Tooling Of Electric Motors

(CONTINUED FROM PAGE 102)

and rotor blanks are produced at each stroke of the press. Each stage of the die is one piece, there being no sections at any stage. The punches of the third stage are 36 separate pieces, held in position with Cerro-matrix. After punching, the stator blanks are annealed for five hours in batch type furnaces, then weighed, and riveted in a hydraulic machine of the company's own design which puts them under 30 ton pressure before the riveting guns are applied.

The next step is to send the stators to the winding room where the windings are inserted, tested, and afterwards dipped and baked for four hours. When the wound stators come from the baking room they are milled on a duplex milling machine (again specially designed) which mills a shoulder on each end to receive the end housings. In this operation both shoulders are milled at the same time in order to maintain as close a tolerance as possible.

The rotor blanks are annealed after punching. They are weighed off, and the copper conductor bars inserted in the holes, after which the bars are rolled into a bead on another specially designed machine. Next, the rotors are welded on the end to connect the copper conductors together. The finish-ground shafts are then inserted, and the rotors ground to size. The centrifugal switch assembly is then pressed on the rotor, thus completing it.

Assembly of the motor comes next, following which comes a running-in test and a series of tests for insulation breakdown, starting and running torque, current draw and starting switch cut-out speed.

An interesting feature of the KASSON all-steel motor is its finish. Instead of the conventional paint job, it has a chip-proof, black oxide finish which is impregnated with a special rust-proofing oil.

Latest news and technical data on gear cutting, finishing and checking methods, equipment and tools. Published as a service to gear producers and users by "GEAR PRODUCTION HEADQUARTERS". Ask for it on your Company letterhead.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD • DETROIT 12, U. S. A.

Thrust-Load Tables

"Thrust Loads Due to Drilling Various Metals" has been prepared in table form by Canedy-Otto Mfg. Co. The thrust load values were computed for drill sizes from 1/16" to 1" in 1/16" steps, 1⅛" to 2" in ⅛" steps, 2¼" to 3" in ¼" steps and include 3½" drill for drilling cast iron and machine steel with feeds of .001, .005, .010, .015 and .020 inch per revolution. The same range of drill sizes up to 1¾" was used for cast steel and carbon steel at the same speeds. Request copies from Canedy-Otto Mfg. Co., Dept. 2-25, Chicago Heights, Ill., or use INFORM-A-GRAM Key No. 225-Z.

Press Alignment

(CONTINUED FROM PAGE 104)

Shank has been assembled on the shank of the die set, it can gyrate in all directions with sufficient latitude to correct up to $\frac{1}{32}$" misalignment. This correction decreases the strain on pins and bushings and increases the accuracy of the register between the punch and die.

Specifications and complete details on this equipment are obtainable on request from Lempco Products, Inc., 5713 Dunham Rd., Bedford, Ohio, or use our postage-free INFORM-A-GRAM Key No. 540.8-Z.

New Whiton Machine Co.

The Whiton Machine Company, manufacturers of steam turbine engines, automatic gear cutting machines, centering machines and lathe chucks, announces its new organization in New London, Connecticut, taking over the business and properties of the D. E. Whiton Machine Co., established in 1840 and at the New London address since 1886.

Chairman of the Board of Directors of the new company is Lucius E. Whiton, son of the founder of the D. E. Whiton Machine Co.; George A. Highberg is president. Both men have had long experience in the machine tool industry and are well known for their patents and improvements in machine tool manufacturing. Mr. Highberg was vice-president and factory manager of the Cushman Chuck Co. for the past ten years.

The secret of my production success has been the use of
MEAD
AIR POWER
The time saved in clamping and holding the work—precious minutes multiplied by thousands—frequently means the difference between profit and loss on a job. And the cost of elaborate fixtures is substantially reduced. The simple, adaptable, single-acting air cylinders illustrated, are only a few of the many sizes and types in the Mead line—also ready-made tools such as Air Presses, Vises, Work Feeders, Valves, Collet Fixtures, Impact Hammers described in the Mead Air Power Catalog. Write today!
MEAD
SPECIALTIES COMPANY
4114 NO. KNOX AVE., DEPT. HA-77 CHICAGO 41, ILL.

Standardize to Economize

CUT COSTS 5 WAYS

These five consecutive tooling costs are cut when NS Tool Room Standards are specified:

1. **Design costs reduced 50% to 80%.**
2. **Toolroom labor reduced as much as 75%.**
3. **Delivery time losses eliminated because of immediate availability of NS standards.**
4. **300% to 500% longer life because NS standards are heat treated and hard chrome plated wherever practical.**
5. **Salvage value of obsolete tooling is greater because standard parts can be used over and over again.**

NOBLE & STANTON, INC.

Manufacturers of Tools, Gages and Their Accessories

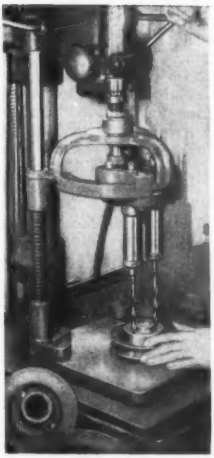
1000 Broadway **Bedford, Ohio**

LINDERME

USERS SAY:

Production UP . . .

Costs DOWN!



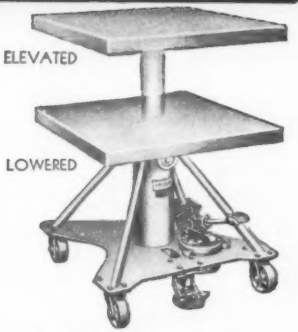
2 HOLES • 1 STROKE

That's simple arithmetic with a LINDERME Two Spindle Drill Head on the job. Here's an adjustable precision drill head *low* in price, *high* in productivity. The versatility of this attachment makes it a gold mine in any shop. Linderme Drill Head users in general and production machine shops, plastics fabricators and others report great savings from a low initial investment . . . It's quickly set to variable centers from ½ to 6", drill capacity up to ⅝", adaptable to various tapping units. Models A and B for sleeve adaptation to drill press quills; Models C and D with "over-arm" arrangement, guide pins, springs and brackets mounted on heavy ground base for use with drill fixtures.

• *Write for Bulletin containing complete details.*

LINDERME
MACHINE & TOOL CO., INC.
12250 COYLE AVENUE
DETROIT 27, MICHIGAN

The *Answer* to Many LIFTING problems...



LYON-*Raymond*
PORTABLE HYDRAULIC ELEVATING TABLE

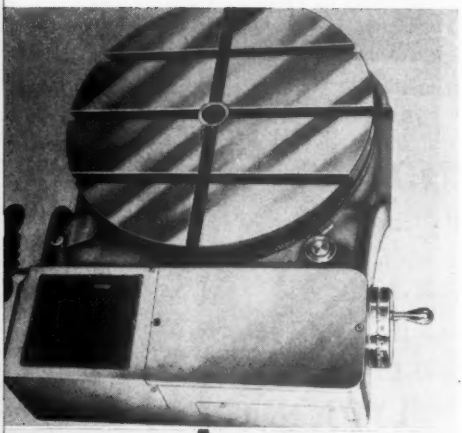
Worried about costs? Speed? Safety? Damage?—and other factors in handling materials? Then look into these many jobs this handy Lyon-Raymond Elevating Table is designed to do.

HERE ARE JUST 12 OF ITS USES:

1. Die handling
2. Sheet feeding
3. Adjustable section in conveyor system
4. Work table
5. Assembly bench
6. Positioning work to machine
7. Support for overhanging work
8. Adjustable test bench
9. Transfer table
10. Positioning parts for attachment
11. Welding positioner
12. Loading and unloading

We have prepared an illustrated bulletin full of suggestions that methods engineers will find most helpful. It's free! Write for your copy today!

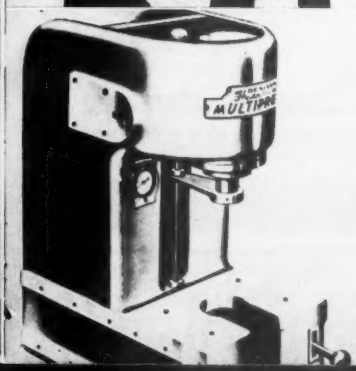
LYON-*Raymond* CORPORATION
808 Madison St. Greene, N. Y.



FOR FURTHER INFORMATION FILL IN KEY NUMBERS ON POSTAGE-FREE INFORM-A-GRAM INSERT

QUICKLY ADAPTING ANY MILLING MACHINE, shaper or horizontal boring mill for power rotary milling or precision indexing work, the new Rotary Table announced by W. B. Knight Machinery Co. virtually eliminates setup time, as no power connection or extra equipment is needed for its immediate operation. It provides for 18 feed changes and an optical feed range of 3" to 108" per minute. Many other features permit easy, accurate operation. A complete description of the table may be secured from W. B. KNIGHT MACHINERY CO., Dept. 3-51, 3920 West Pine Blvd., St. Louis 8, Mo., or use INFORM-A-GRAM Key No. 351.5-Z.

REMOVING PUNCH HOLDERS FROM DIE BEDS and separating dies that have been assembled together for some time, the Producto Punch Holder Remover also can be used for shearing in small punches and dies and for general utility around a tool room and maintenance department. The movable holder clamps around the shank of the punch holder and lifts it off the liner pins and the punchout of the die. A special auxiliary screw to grip the punch holder proper does the job if there is no shank. More data may be requested from THE PRODUCTO MACHINE CO., Dept. 91, 990 Housatonic Ave., Bridgeport, Conn., or use INFORM-A-GRAM Key No. 91.5-Z.

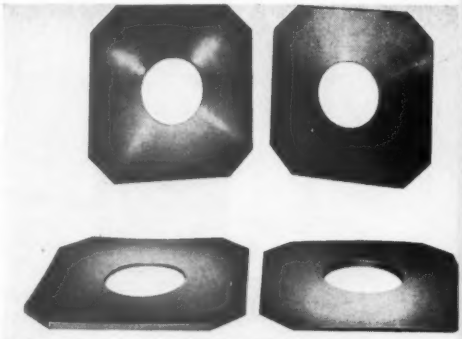


GIVING RAPID RAM SPEED FOR THE APPROACH OF ITS RAM STROKE and regulative speed for the pressing portion, the Denison "Multi-Speed" control is now standard equipment on all of the basic Multi-Press units, making them easily adaptable to varied and new applications. The 4 ton unit gives 200 ipm rapid ram speed, pressing speed regulative between 20 and 200 ipm; upward stroke between 800 and 8000 pounds. Further details may be secured from THE DENISON ENGINEERING CO., 1197 Dublin Road, Columbus 16, Ohio, or use INFORM-A-GRAM Key No. 260-Z.

PROGRESS ON PARADE

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS

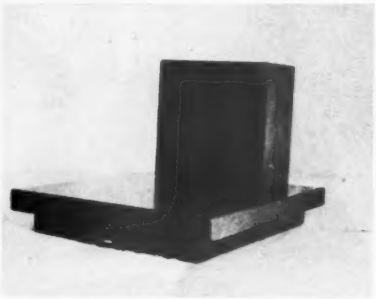
EASILY AND AUTOMATICALLY CORRECTING THE COMMON PROBLEM of punch press misalignment, Lempco Di-Ali-Ners are matched spherical plates, one concave, one convex. The Di-Ali-Ners, with a cushion of oil between, are placed with the die set; one plate then floats on the other, thus correcting any error whether front or back, left to right or diagonal. When the job is locked up, the Di-Ali-Ners become an integral part of the die set. Made of a special cast iron analysis, these plates are machined and cadmium plated to assure long service life. Special details and specifications with prices are carefully given in new literature available from LEMPCO PRODUCTS CO., INC., Dept. 5-40, 5711 Dunham Rd., Bedford, Ohio, or use INFORM-A-GRAM Key No. 540.5-Z.



FEATURING LOW SHUT HEIGHT, air slug ejection, closer hole centers, simplicity of construction, complete salvageability and wide range of hole sizes, Raar punch and die units are simply mounted with only two screws. A half-turn enables removal of stripper and stripper guide for easy punch and die unit replacement. Usable in cut-off, notching, blanking and other press operations without the retainer, the stepped die construction and height is especially suitable with standard die steels. Detailed material may be requested from RAAR MFG. CO., Dept. 24, 1663 N. Highland, Los Angeles 28, Calif., or use INFORM-A-GRAM Key No. L24-Z.

OFFERING INSTANTANEOUS ELECTRONIC CONTROL ACTION, together with an "anticipating" factor which holds temperature tolerances as close as 1/5° F. plus or minus and power "on-off" cycles as short as 3 seconds, the new Xactline Capacitrol has no gears, cams, motors, bearings or other mechanical parts to maintain. It is simply adjusted for wide range control requirements and operates inexpensively. Available in two distinct models for varying requirements, the new Capacitrol is compactly designed, in an easily installed flush or surface mounted case. Get additional information about this instrument from CLAUD S. GORDON CO., Dept. 7-59, 3000 S. Wallace Street, Chicago 16, Ill., or use INFORM-A-GRAM Key No. 759-Z.

FREE FROM WARP, RUST AND BUMPS, Rahn Black Granite Surface Plates guarantee a surface accuracy to .00005". Because of their extreme hardness, these black granite plates cannot become imbedded with abrasives. Smooth action in moving instruments is assured by the special care given in finishing these plates. For additional details and specifications write RAHN GRANITE SUR-

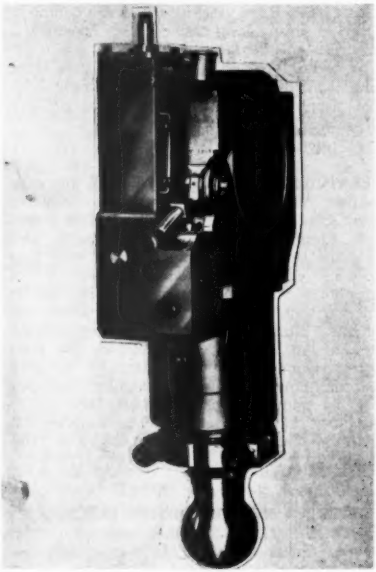


FACE PLATE CO., Dept. 63, 1149 Platt Circle, Dayton 7, Ohio, or use INFORM-A-GRAM Key No. K63-Z.

PROVIDING RAPID, UNIFORM, ACCURATE HEATING FOR TEMPERING and other operations at temperatures below 1200° F., two new Cooley Recirculating Air Draw Furnaces are adaptable to tempering or drawing both carbon and high speed steels and non-ferrous heat-treating. Both of these small furnaces are well suited to the production of small

parts and laboratory testing. A temperature uniformity of plus 5 minus 0 degrees is attainable. Heating elements are located behind vertical baffles on either side of the heating chamber; an impeller type fan forces air between the baffles and heating units, down through the work and back to the fan in a steady flow. Inquiries will be answered by COOLEY ELECTRIC MFG. CO., Dept. 5-87, 32 S. Shelby St., Indianapolis, Ind., or use INFORM-A-GRAM Key No. 587-Z.

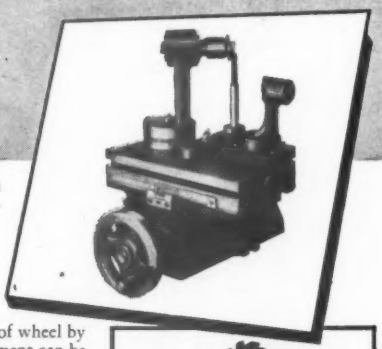
GIVING THE NECESSARY PUNCH PRESS TONNAGE PROTECTION within the maximum tonnage capacity of the press, the new Model HP Safety Overload Connecting Link not only protects the crank and press frame, but also can be arranged to protect any of the tools



used in the press. Applicable to all punch presses by replacing the present conventional pitman or connecting rod and ram adjusting screw, this attachment will also compensate for stock thickness variation or the inserting of two blanks on a forming die on all operations. Get more information from DAYTON ROGERS MFG. COMPANY, Dept. 6-19, Minneapolis, Minn., or use INFORM-A-GRAM Key No. 619-Z.

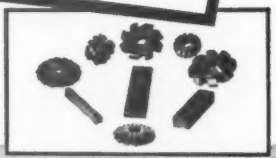
EMPLOYING NO BOARDS OR OTHER FORM OF FRICTION LIFT, the new "Ceco-Drop" board drop type hammer utilizes air

M.R.E.
RADIUS ATTACHMENT



The M. R. E. Radius Attachment does away with setting the workpiece or diamond to a given distance from a central pivot. No part of the fixture moves more than the desired amount as measured on the Vernier Scale, which gives it a distinct advantage over other types of radius attachments which describe a circle greater than the one required. Convex and concave work of various radii up to 1½" can be produced with one width of wheel by adjusting the table. The M. R. E. Radius Attachment can be used on lathes, grinders, vertical and horizontal milling machines, etc. It can be used as an indexing attachment for jig boring by using an index plate supplied by the makers.

Write today for complete information. Address Dept. TD-7.



A few of the components which can be processed by the M.R.E. Radius Attachment. ⟶

ACCREYLON COMPANY, INC. 130 West 42nd St., New York 18, N. Y.

Sole U. S. Agent

Mfd. by Manchester Repetition Engineers, Ltd., Manchester, England

WRITE FOR FREE CATALOG

DRILL JIG BUSHINGS

Accurate Interchangeable Concentric

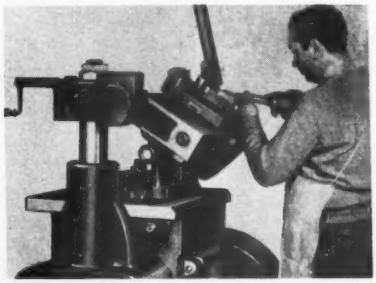
Acme Industrial Company

206 N. LAFLIN STREET, CHICAGO 7, ILLINOIS

or steam to raise the ram, with a simple clamp arrangement to hold the ram and rod at the top of the stroke. Because of the increased speed of this new hammer, metal can be forged at higher temperatures and

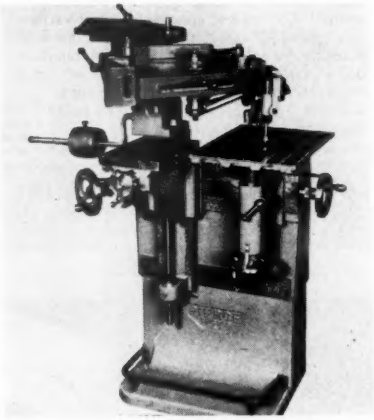
forgings are better matched through the use of parallel integral guides (electronically hardened), heavier frames and low center of gravity which insures against movement and vibration. Safe and easily adjustable and serviced, the "Ceco-Drop" will be explained more fully upon request to CHAMBERSBURG ENGINEERING CO., Dept. 6-71, Chambersburg, Pa., or use INFORM-A-GRAM Key No. 671-Z.

A TRYOUT PRESS, which tries dies under actual production conditions and makes finishing easier and more accurate, has been developed by Alpha Tool Works. Bringing to light the necessary corrections which often are not detected until the die has been shipped, this special press allows the necessary finishing work to be done on both male



and female members without removal from the press. Position pins retract with a crank, allowing bolster and head to be tilted so that the die is made easily accessible for work. When corrections are completed, the die returns to the original position for accurate check of the corrections. A fully-illustrated explanatory catalog sheet is available from ALPHA TOOL WORKS, Dept. 20, 6420 Beechton, Detroit 10, Mich., or use INFORM-A-GRAM Key No. L20-Z.

SIMPLE IN DESIGN, rigid in construction, yet sensitive and accurate, the Pierce Three-Dimensional Pantograph features a dynamically balanced spindle which requires only



deft manipulation and not lengthy training on the part of the operator. Large, legible dials and easily reached controls and work area, with changeover of the controls from two to three dimensional operation speedily accomplished, make this machine efficient as well as versatile. No special equipment is necessary for enlarging. Further operational details regarding this desirable Model R-2 will be fully described upon request to PIERCE MACHINE TOOL CO., Dept. 26, 617 W. Jackson Blvd., Chicago 6, Ill., or use INFORM-A-GRAM Key No. L26-Z.

DEMAGNETIZING MAGNETIC CHUCK AND PARTS completely and automatically, the Neutrofier, rectifier and demagnetizer, offered by Hanchett Mfg. Co. in combination with their Laminated Top Magnetic Chucks, requires only a few seconds for demagnetizing. Mountable anywhere for the operator's convenience, it may be operated from any alternating current outlet. This unit also can be

LINLEY

FOR NOISELESS, HIGH SPEED RIVETING

Rotary spinning principle shapes uniform heads, silently . . . capacities up to 3/8 inches diameters. Adjustable spindle stroke, controlled pressure . . . double row radial thrust bearing supports spindle, assures long life. Table elevating screw prevents slipping. Six floor or space-saving bench models . . . sturdily built for trouble-free operation under severe production schedules.

FOR COMPLETE INFORMATION, WRITE FOR BULLETIN.

LINLEY BROTHERS CO., 662 STATE ST. EXTENSION BRIDGEPORT 1, CONNECTICUT

Severance

TUBING CUTTER GROUP - FOR FAST DEBURRING OF EVERY MACHINEABLE TYPE TUBE . . .

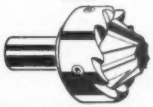
TUBE DEBURRING CUTTERS (Standard)

18 Standards in H.S.S. and Cemented Carbide

ADJUSTABLE TYPE

Adjustable from 1/2" - 2-1/2" O.D.—for short runs

TUBE CHAMFERING MILLS



23 sizes from 3/16" - 2-1/2" O.D. — Chatterless

SOLID TUBE DEBURRING CUTTERS

16 sizes from 1/4" - 1-5/8" O.D. — H.S.S. and Carbide

SPECIAL TUBING CUTTERS

From light hand-deburring up to close tolerance deburring, chamfering, flaring . . . For working non-ferrous metal, steel (including stainless) and plastic tubing . . . For combining reaming, sizing or flaring with end facing and deburring . . . Whatever the operation or material, Severance HSS and Cemented Carbide Tube Deburring Cutters are TOPS in performance — long life — economy.

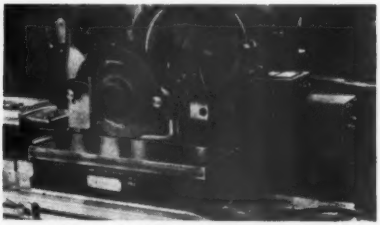
Write for Catalog No. 16

COMPLETE REGRINDING SERVICE BY NEW TOOL CRAFTSMEN SAVES YOU MONEY.

SEVERANCE TOOL INDUSTRIES INC.

730 IOWA STREET

SAGINAW, • MICHIGAN



used for demagnetizing parts that have become magnetic from other than holding operations. Further details about the Neutrofier and its usage may be requested from HANCHETT MFG. CO., Dept. 22, Big Rapids, Mich., or use INFORM-A-GRAM Key No. A22-Z.

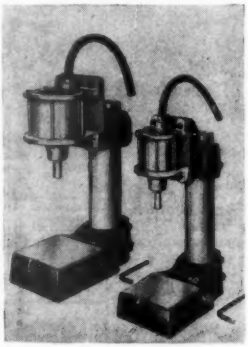
OUTLASTING ORDINARY COATED DISCS. Bayflex Raised Hub Disc Wheels are versatile, rugged and easily adaptable to a wide variety of jobs. Recommended for removing welding scars and rough edges from mold

joinings and as a cut-off tool on a bench grinder, these disc wheels easily grind in grooves and corners and large radii on castings. They are available in a wide variety of standard sizes and grits in discs 7" and 9" with $\frac{1}{8}$", $\frac{3}{32}$" or $\frac{1}{16}$" thicknesses. More complete, detailed information regarding these disc wheels may be secured from BAY STATE ABRASIVE PRODUCTS CO., Dept. 2-05, Westboro, Mass., or use INFORM-A-GRAM Key No. 205-Z.

PIERCING MILD STEEL UP TO ¼" THICK. the Wales Heavy-Duty Type "CJ" Hole Punching Unit features a pedestal die that permits the punching of angles and channels as well as flat sheets. Consisting of a punch holder, die and stripping mechanism, the unit design eliminates the necessity of attaching punch to press ram and assures permanent alignment of punch and die. Wales units are easily assembled into a hole punching die setup on T-slotted plates or templates and placed in stamping press or press brake ready for the first stroke. Type "CJ" Units are available

in three holder widths with maximum punch diameter of $\frac{7}{8}$". Request completely illustrated bulletin from WALES-STRIPPIT CORP., Dept. 60, 355 Payne Ave., No. Tonawanda, N. Y., or use INFORM-A-GRAM Key No. 60.5-Z.

COMBINING THE FEATURES OF BOTH ARBOR AND KICK TYPE EQUIPMENT, the two new Air Arbor presses announced by Air-trol can be set by regulating the air line pressure to give just the right amount of uniform pressure on each application to do the



job without the danger of crushing, or irregularity of work. A full stroke is delivered with less than one inch of foot movement, requiring a minimum of operator effort and leaving both hands free for work handling. One model is heavy duty (weight 75 pounds) and delivers over ¾ ton squeeze at 150 pounds line pressure; the other smaller model (weight 40 pounds) delivers ¼ ton at 150 pound line pressure. Write AIR-TROL, Dept. 38, 2653 W. Lake St., Chicago 12, Ill., or use INFORM-A-GRAM Key No. K38-Z.

DO IT CHEAPER Because YOU DO IT FASTER!

SAWING
FILING
LAPPING

OLIVER DIE MAKER

The Oliver Die Making Machine is truly a heavy duty machine but performs equally as well on light work . . . Many of these machines have been in continuous use for over 25 years; sawing, filing and lapping tool steels up to 1″ thick. (Heavy duty model for 3″ work.)

Direct labor costs in many cases have been cut 50 to 60%.

Send for Catalogue

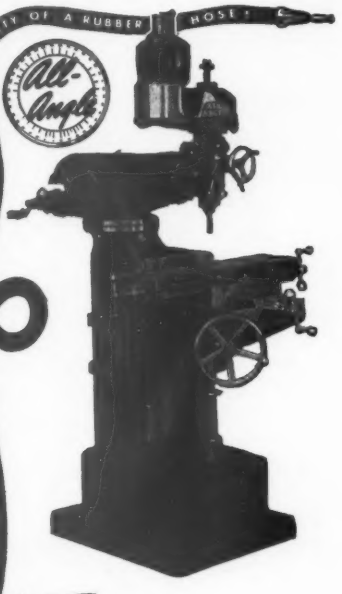
IMPROVE YOUR TOOLROOM IT'S THE BACKBONE OF PRODUCTION

OLIVER INSTRUMENT CO.
1436 E. Maumee Adrian, Michigan

OLIVER OF ADRIAN

FLEXIBILITY OF A RUBBER HOSE!

All-Angle



Fray

PRECISION RAM TYPE NO. 7-B
VERTICAL UNIVERSAL
MILLING MACHINE

- Flexible
- Sturdy
- Universal
- Easy to operate
- One set up
- All angles quickly obtained

- Four Sizes
- Four Types
- Adaptable to all Milling Machines

For further information write Dept. M

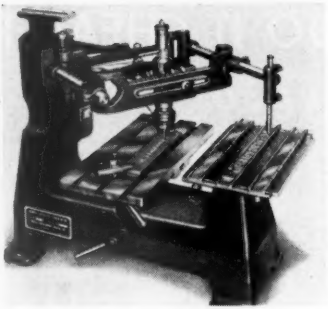
NATIONAL DISTRIBUTORS
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE 4, R. I.

PROGRESS ON PARADE

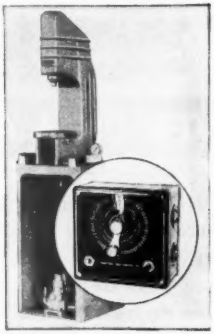
IMPROVED AND COMPLETELY REDESIGNED, the Eclipse Automatic Shop Furnace is now made of fabricated steel instead of castings. No transmission is required in the operation of the Eclipse centrifugal blower which is now driven by a direct-connected •

motor, with the proportion of gas and air automatically regulated by a McKee Proportional Mixer. All working parts are protected against dust and damage by a new streamlined body. Requiring little floor space, this furnace is designed for hardening punches, dies and small tools and will handle carbon, intermediate and high speed steels. New Bulletin D-1 describing this and other Eclipse Shop Furnaces may be requested from ECLIPSE FUEL ENGINEERING CO., 775 S. Main St., Rockford, Ill., or use INFORM-A-GRAM Key No. L27-Z.

DESIGNED ESPECIALLY FOR ENGRAVING AND PROFILING IN STEEL AND BRASS, including small die work, the Model UE-3 Panto heavy duty bench model utility engraver operates on cylindrical, spherical, concave or convex surfaces. The forming guide arm attaches to the pantograph carrier and a hardened steel guide, formed to correspond with the shape of the work to be engraved, is attached to the arm. Four spindle speeds, from 5000 to 12,000 rpm, are obtainable and pantograph reduction ratios from 1.7:1 up to 7:1. Other information about this engraver and available attachments may be requested from H. P. PREIS ENGRAVING MACHINE CO., 159D Summit St., Newark 4, N. J., or use INFORM-A-GRAM Key No. D58-Z.



AUTOMATICALLY COMPLETING THE CYCLE OF EACH RAM STROKE after delivering the full predetermined pressure, the new timing device developed for use with Air-Hydraulic Presses does not necessitate holding down a button until the down stroke is



completed. Double controls safely take the operator's hands out of danger to start the ram cycle. The Air-Hydraulic Press and Timing Device, plus an indexing unit, may be set for completely automatic multiple cycling in all types of assembly, forming, marking and other operations in volume production work, whereby the operator simply has to mount the work units on the indexing fixture at a set speed most suitable for him. Ram dwell may be set from fractional parts of a second to two minutes. Write for other details to AIR-HYDRAULICS, INC., Dept. 51, 401 Broadway, New York 13, N. Y., or use INFORM-A-GRAM Key No. J51-Z.

PORTABLE WORK BENCH

MECHANICAL MUSCLE

Portelvator, the Hamilton Portable Elevating Table, forms a work bench when and where you need it. Saves the use of "extra hands" in moving and lifting heavy loads. Levels and supports overhanging work.

May be worked at from four sides. Three table surfaces. Four point support. Fast lift and slow lift mechanism. Positive floor lock.

Standard model capacities, 1,000 to 5,000 pounds. Special models built on order.

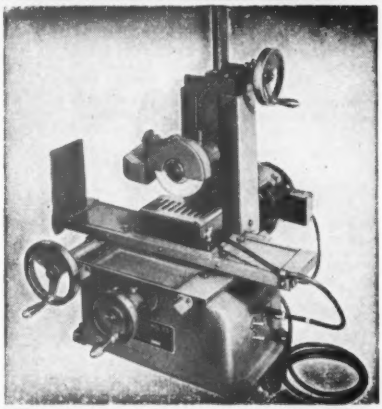
Write for Bulletin P-47.

SUPER SENSITIVE DRILLING AND TAPPING MACHINES · PORTELVATORS

THE Hamilton TOOL COMPANY

812 SO. NINTH STREET · HAMILTON · OHIO · U. S. A.

SANFORD



High-Speed BENCH SURFACE GRINDER

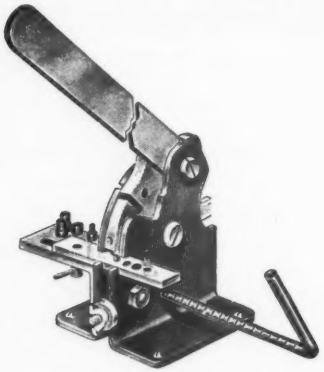
ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed *"For the job that fits in your palm."*

Write for bulletin on this Model SG and also new, larger Model MG.

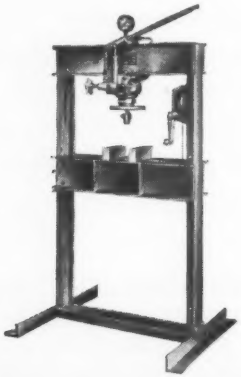
SANFORD MFG. CO.
1020-28 Commerce St.
Union, N. J.

ACTUALLY FOUR TOOLS IN ONE, the No. 10 Bench Tool is a complete metal workshop which can shear, punch, form and rivet. Mounted to a work bench with four bolts, this tool outfit includes three punches and



two rivet sets which are interchangeable. Especially suitable for research departments of industrial plants, this versatile tool is 5" high, 4" wide and 13" long. All working parts are heat-treated. Selling for less than ten dollars, this tool will be explained in detail in literature available from RAY LEWIS ASSOCIATES, INC., Dept. TD, 11 Niagara Street Building, Buffalo 2, N. Y., or use INFORM-A-GRAM Key No. L25-Z.

FEATURING A FAST MOVING RAM WHICH SAVES OPERATION TIME, the new 25 ton hydraulic press, announced by Dake Engine Co., is built especially for use in maintenance, service and industries requiring only a 25 ton press size. This model 25H complements the regular large Dake presses available up to 75 ton capacity and likewise is constructed of reinforced arc-welded steel channel. Handling work up to 33½" in diameter, the 25H press outfit includes two combination table and V-blocks, round nose for pressing, pressure gauge and table hoisting mechanism. Request additional data from DAKE ENGINE CO., Dept. 19, Grand Haven, Mich., or use INFORM-A-GRAM Key No. L19-Z.



WELL MADE FOR MORE ACCURATE, SMOOTH ACTION OPERATION, the Grunow Pillar Unit Die Set cuts die maintenance cost, is transferable from job to job without loss of accuracy. Contractable diamond bored phos-

phor bronze bushings give an especially good fit. For accessibility, the posts are removable, have taper and straightness concentricity within .00002" and their stubby design permits the use of smaller diameters. Get facts from A. W. GRUNOW, INC., Dept. 29, P. O. Box 2, West Orange Branch, Orange, N. J., or use INFORM-A-GRAM Key No. L29-Z.

DESIGNED TO GIVE STANDARD VOLTAGES where only 110 volt, single phase current is available, the Reid Phase Converter

NEW SPEED-CAPACITY-ACCURACY IN CUTTING OFF METALS

The JOHNSON METAL CUT-OFF BAND SAW

THREE POINT BASE eliminates all twisting strain on bed.

CENTRALIZED CONTROLS all at front of machine—no reaching—no extra steps.

LARGE CAPACITY—10" high, 18" wide—that extra capacity when you need it.

RIGID BOX TYPE FRAME—stiff support for the oversize wheel bearings. All running parts covered.

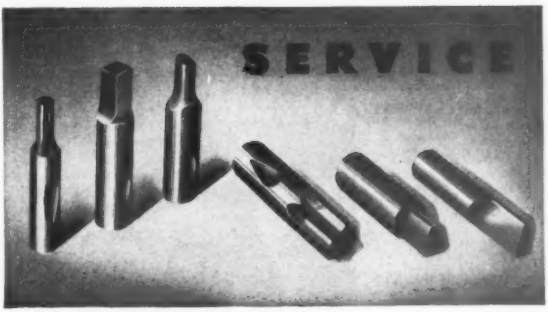
HYDRAULIC CONTROL of feed, with quick-adjustable slide weight, maintains correct blade pressure.

QUICK ACTING VISE instantly adjustable to the job.

BOLT ACTION STOCK STOP for duplicate lengths.

Years of experience behind the design of this machine give it exceptional sturdiness, speed, and long blade life. A profitable time-saver in any shop. Full details in the bulletin—on request.

JOHNSON MANUFACTURING CORP.
623 CHRYSLER BLDG.,
NEW YORK 17, N. Y.



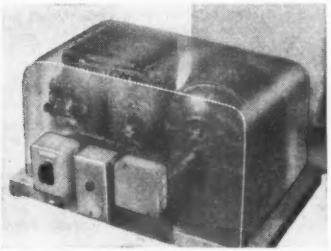
WITH A *Punch!*

Allied's R-B Interchangeable Punches and Dies for the metal-working and plastics industries are *available from stock* in standard round, oblong and square shapes of almost any required size. Special shapes, such as those illustrated, are *promptly furnished* to your specifications in any size or material. Full information and comprehensive R-B Catalog on request.

ALLIED PRODUCTS CORPORATION

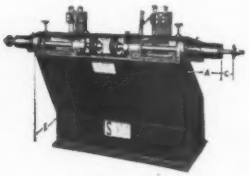
Department 21 ● 4634 Lawton Ave. ● Detroit 8, Michigan

renders 220 volt 3 phase current and drives any machine up to 1½ HP capacity. Eliminating the necessity of running in a higher



voltage line, this unit is compact, long-wearing, and of rugged construction. Only one moving part requires occasional lubrication. Questions should be forwarded to REID BROTHERS COMPANY, INC., Dept. 38, Beverly, Mass., or use INFORM-A-GRAM Key No. F38-Z.

CONSTRUCTED SO THAT EACH OF ITS TWO MOTORS IS INDEPENDENT FROM THE OTHER, the two motor Proper Speed Buffing and Polishing Machine manufactured by The Standard Electrical Tool Co. has an overhang construction. Because each side of the machine has its own motor, starting equipment,

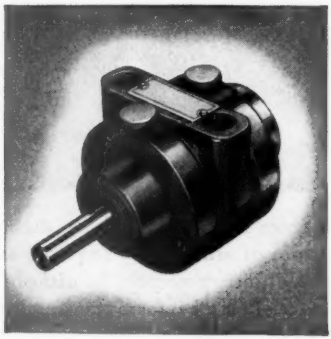


multiple V-belt drive, shaft lock, etc., the operator is unaffected by operation on the other side of the machine. Additional available equipment is a hand brake for quickly stopping the spindle or the coincidental arrangement of stopping the spindle and shutting off the current. A variety of sizes and speeds are available along with a "Speedial" control which provides a speed range between 1500 and 3000 rpm. Further details and specifications are available from THE STANDARD ELECTRICAL TOOL CO., Dept. 4-70, Mt. Hope & Sixth St., Cincinnati 4, Ohio, or use INFORM-A-GRAM Key No. 470-Z.

A SPEED RANGE FROM 1500 rpm to 3000 rpm is possible by means of a hand-operated dial on the Hammond Model "Vrol" 3 hp Variable Speed Polishing and Buffing Lathe. A spindle overhang of 8" facilitates operations on large and irregular shaped parts. The V-belt drive motor is mounted in the base. The new machine and other Hammond

polishing and buffing equipment is illustrated and described in Catalog No. 55, available from HAMMOND MACHINERY BUILDERS, INC., Dept. 95, 1600 Douglas Ave., Kalamazoo 54, Mich., or use INFORM-A-GRAM Key No. 95-Z.

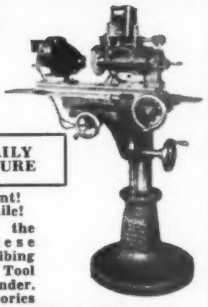
APPLICABLE IN PLACE OF ELECTRIC MOTORS ON PORTABLE OR STATIONARY EQUIPMENT, the new Gast Model No. 1 Air Motor is explosion-proof and of simple design. By centrifugal force, four one-piece slide vanes, fitted into a shaft-mounted rotor, slide



outward in a shell presenting their surfaces to the incoming air to cause rotation. The motor will start in any position, will not spark nor burn out because of overload or sudden braking. This 0 to 1/6 HP explosion-proof motor is fully detailed in Catalog No. 1

GREENFIELD

...THE GRINDER SHOP MEN PREFER



MAKES YOUR DAILY GRIND A PLEASURE

Precise! Efficient! Rugged! Versatile!

Shop men "in the know" use these words in describing the Greenfield Tool & Cutter Grinder. Shop-built accessories may be added to make a Universal Grinder that will efficiently handle any grinding operation within its capacity.

Investigate this Tool & Cutter Grinder —you will find that smoother operation, better satisfied workmen and faster production are all possible with a Greenfield in your shop.

Bulletin No. 4 gives complete specifications. Write for yours today.

PRODUCTION MACHINE COMPANY
GREENFIELD, MASSACHUSETTS

Darwin

NEOR

The Original Oil Hardening, Non-Deforming High Carbon-High Chrome Steel

Outstanding in its class! Your best steel for mass production dies. Possesses high resistance to abrasion, non-deforming, uniform hardness penetration to center of tool. Keeps a keen edge longer than most other tool steels. Ideal for slitting cutters.

FURNISHED IN BILLETS, BAR STOCK AND DRILL ROD.
BULLETIN ON REQUEST

DARWIN & MILNER Inc.
highest grade tool steels
1260 W. FOURTH ST. CLEVELAND 13, OHIO

As Every Machinist Knows—
IT PAYS to REDUCE TAP BREAKAGE

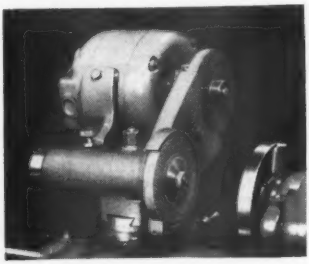
Does the job in a fraction of the time required for hand tapping. Because the work is dependably straight and square, tap breakage is practically eliminated—and gone are the wasted hours of trying to pry broken taps out of dies. Equipped with seven Adaptors, ranging from 8-32 to ½", it takes care of 95% of all tapping requirements. (Taps not furnished.) $52.50 F.O.B. Minneapolis. Ask your mill supply house, or write Dahlstrom Mfg. Co., 422 South 6th St., Minneapolis 15, Minn.

Dahlstrom TAP GUIDE

- 12" x 6" x 14"
- Fastens to wall or bench
- Anyone can operate it

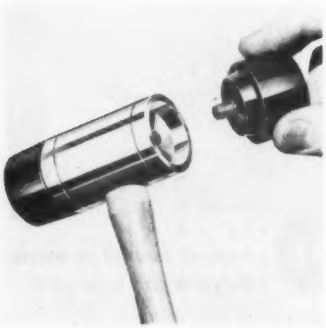
obtainable from GAST MFG. CO., Dept. 21, Benton Harbor, Mich., or use INFORM-A-GRAM Key No. L21-Z.

DESIGNED PRIMARILY FOR PRECISION EXTERNAL GRINDING, the powerful electric grinding attachment developed by South Bend Lathe Works for use on lathes and other machine tools is equipped with a 4" x ½" grinding wheel which is driven by a

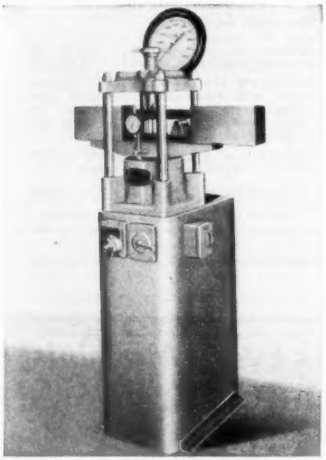


constant speed continuous duty ¼ HP motor, which permits heavier sustained loads than a universal type motor of the same horsepower. Pre-lubricated sealed precision ball bearings which require no adjustment or additional lubrication assure a smooth running grinding wheel spindle. There is tension adjustment for the V-belt. Grinding wheels for various materials are available. More complete information may be secured by writing to the SOUTH BEND LATHE WORKS, 432 E. Madison St., South Bend 22, Ind., or use INFORM-A-GRAM Key No. 564.5-Z.

ENABLING THE OPERATOR TO SELECT THE EXACT HARDNESS of hammer to do the job at hand, replaceable hammer tips of three grades of hardness are featured with the new series of Nupla Hammers introduced by the New Plastic Corp. Designed for all-purpose use, the Nupla Hammer, which is made of exclusive "live" material known as Nuplaflex, has no rebound or sting and will not mushroom under constant use. Two tips of different grades may be kept on the hammer at the same time, while the third is substituted by spinning the tips on or off. Available in five sizes and ten weights, this hammer will be further discussed by NEW PLASTIC CORP., Dept. 9-88, 1017 N. Sycamore Ave., Los Angeles 38, Calif., or use INFORM-A-GRAM Key No. 988-Z.



HIGHLY SENSITIVE, yet adaptable to making transverse tests with equal accuracy and efficiency on various specimens up to its full 10,000 lb. capacity, the Model TR-1 Transverse Testing Machine is easily operated at



speeds and voltages meeting operator and job requirements. The maximum indicating hand of the specially constructed gauge remains stationary when the specimen breaks, permitting the operator to get accurate readings even though he is not looking at the dial at the time of the ultimate breaking point. Inquiries for further details should be mailed to STEEL CITY TESTING MACHINES, INC., Dept. 79, 8843 Livernois Ave., Detroit 4, Mich., or use INFORM-A-GRAM Key No. E79-Z.

FEATURING VERTICAL OPERATION for in-line or straight type motor blocks, the new Ex-Cell-O Standard Style 66 Vertical Precision Cylinder Boring Machine has a massive, rigid base and accurately ground tableways. The blocks move from the conveyor line to the machine where they are located, clamped

CRATEX

Rubberized Wheels • Blocks • Points

CRATEX cuts **faster**, polishes **better** and lasts **longer**. Requests for Catalog, samples or specific information will be answered immediately.

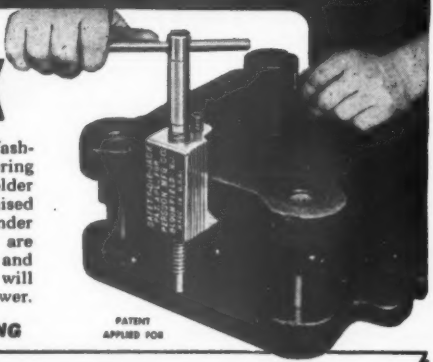
AT TOOL AND SUPPLY DEALERS

CRATEX MANUFACTURING COMPANY • 95 Natoma Street • San Francisco, Calif.

NOW YOU CAN SEPARATE AND ASSEMBLE DIE SETS.. *QUICKLY.. EASILY.. SAFELY!*

with a PERSSON

DIE JACK

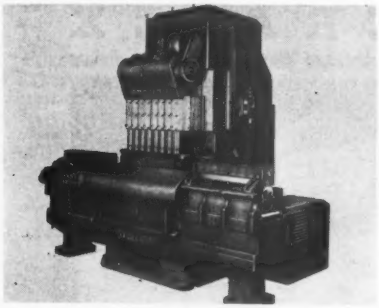


These Die Jacks eliminate old-fashioned, unsafe, prying or hammering methods. Just clamp on punch holder and turn handle. Punch holder is raised or lowered smoothly, always under control. PERSSON Die Jacks are precision built from fine steel and alloys—a tool every tool maker will want for his tool box or bench drawer.

NO PRYING • NO HAMMERING

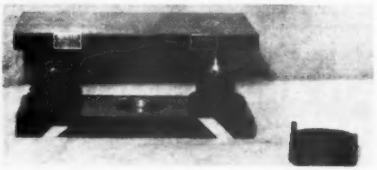
PATENT APPLIED FOR

PERSSON MFG. COMPANY, 2 HENRY ST. BLOOMFIELD 4, N.J.



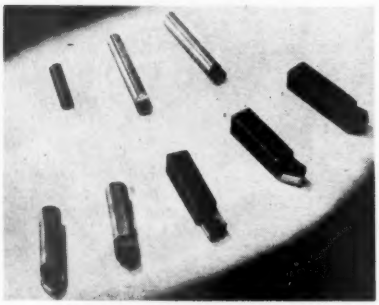
and bored, then unclamped and, in the same position, continue on the conveyor. A copy of Vol. 22, No. 4, of "Tool-Tips", discussing this machine, is available from EXCELL-O CORP., Dept. 7-37, 1200 Oakman Blvd., Detroit 6, Mich., or use INFORM-A-GRAM Key No. 737.5-Z.

PUNCH PRESS DOWN TIME and die injury, caused by bound, scored or galled pins, can be eliminated by Microlex Anti-Friction Die Sets. Fast production of parts to tight limits of accuracy and reduction of scrap loss due



to cut down on rejects are obtainable with these die sets. The ball bearing guide pins permit easy opening and closing of the die set by hand for setting up. In actual production runs they have been successfully used on presses operating at speeds in excess of 1500 strokes per minute. To assure that there will be no distortion to the plate when the insert die and punch are assembled by the user, the manufacturer prefers to finish the die shoes to within .015" of the final dimensions. Further detailed information is available on request from the EVANS REAMER & MACHINE CO., 529 S. Main St., New Lexington, Ohio, or use INFORM-A-GRAM Key No. 733-Z.

NEWLY AVAILABLE, a comprehensive line of standardized carbide tipped boring tools, including five new styles in four to six sizes, represents additions to the standard stock line of round shank square end tools carried by Carboloy Co., Inc. Two types of the new style tools are round shank for 30° and 45° boring bars and three types, square shank for 30°, 45° and 90° bars. They all have a

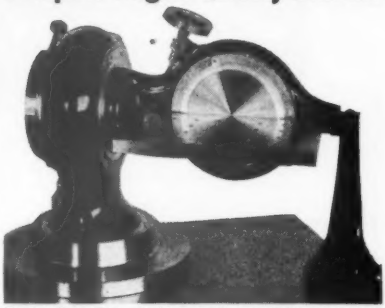


primary clearance of 7° and secondary clearance of 10°. These new boring tools and other carbide lines will be discussed further by CARBOLOY CO., INC., Dept. 82, Box 237, Roosevelt Park Annex, Detroit 32, Mich., or use INFORM-A-GRAM Key No. 82.a-Z.

DESIGNED FOR CLEANING DIES AND SMALL ASSEMBLIES between machining operations, the "Agitor, Jr." announced by Gray-Mills Corp. has an average operating capac-

ity of four gallons of solvent and is equipped with large and small (fine mesh) baskets. It is useful as an independent bench unit or shelved within a larger Agitor. This outfit will be further described in explanatory literature available from GRAY-MILLS CORP., Dept. 5-55, 1951 Ridge Ave., Evanston, Ill., or use INFORM-A-GRAM Key No. 555-Z.

Compute Angles Quickly with the



STUDLER ANGLE COMPUTER

● THE STUDLER ANGLE COMPUTER so simplifies layout of die work, survey of castings, and inspection of precision-machined parts that users report it is doing the work in one-half to one-tenth of the time required by other methods. With this instrument, only one set-up of the work is required since its surface plate may be rotated 360 degrees in each of three separate directions of rotation: horizontally, vertically, and radially. A part having a number of angles and related angles may be surveyed in a few MINUTES. Model "A". Surface Plate 9" x 4½" x ½". Model "G" (shown above) Surface Plate 16" x 9" x 1". Write today for Bulletins No. 2 and No. 5.

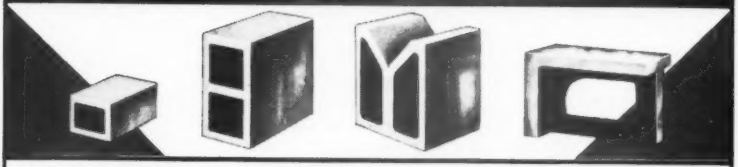
THE ANGLE COMPUTER COMPANY

1709 Standard Avenue GLENDALE 1, CALIF.

Accurate, Trouble Free Production

. . . WITH . . .

CHALLENGE SURFACE PLATE EQUIPMENT



BOX PARALLELS
Made in 18 sizes from 1½x2x4 to 12x12x24 in.

SOLID PARALLELS
Made in 14 sizes.

V-BLOCKS—7 Sizes
From 4x5x3¾ in. to 8x10x5½ in. These and Companion pieces are all made of fine-grained, special analysis, semi-steel castings.

UNIVERSAL IRONS
4 Sizes, from 4x5x3¾ to 8x10x5½ in.
Companion pieces—
ANGLE PLATES—
22 Sizes

Challenge

557

THE CHALLENGE MACHINERY COMPANY

MAIN OFFICE AND FACTORY: GRAND HAVEN, MICH.

Hammond
OF KALAMAZOO

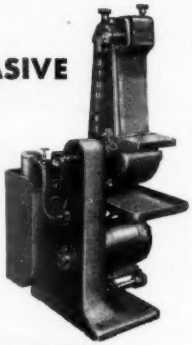
CARBIDE TOOL AND ABRASIVE
BELT GRINDERS

WET and DRY MODELS

Model W-10, 10" Wet Carbide Tool Grinder — one of a complete line including Chip Breaker Grinders.

HORIZONTAL or VERTICAL

Model VH-6, 6" Wet-N-Dri Abrasive Belt Grinder, vertical or horizontal — one of many types and sizes.



WRITE FOR DESCRIPTIVE BULLETINS

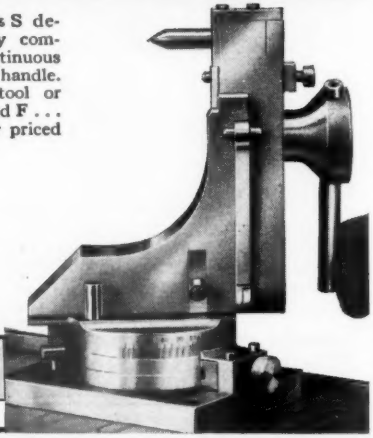
Hammond Machinery Builders INC.
1631 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

Fluidmotion* Radius and Angle Dressers
save time in ACCURATE FORM DRESSING

"FLUIDMOTION", an exclusive J & S development, automatically blends any combination of angles and arcs in **one** continuous motion, with **one** setting, using **one** handle. Produces clean, precise form without tool or chatter marks. Available in models C, E and F . . . also the Form Master, an accurate lower priced dresser. Send for folder.

Fluidmotion FEATURES

- automatic centering
- .0001" accuracy
- one setting per form
- chatterless
- 14" wheel capacity
- large radius range
- dustproof



*REG. U. S. PAT. OFF.

J&S TOOL CO.
481 Main Street, East Orange, N. J.

A TDJ FEATURE PRESENTATION — DIES AND STAMPINGS

PUBLICATION PREVIEWS

Keep Informed! CATALOGS • BULLETINS • SPECIFICATIONS

Use our postage-free Inform-a-Gram for your request

DEMOUNTABLE LEADER PINS, BUSHINGS AND SHANKS, independent of the punch holder and die shoe, are an achievement of E. A. Baumbach Mfg. Co., which enables any metal stamping shop or die maker to produce his own die sets. Steel or castings for the shoe and punch holder are obtained locally, saving considerable expense in shipping. A recent circular contains detailed information on the savings factors and suggestions of interchangeability with other die sets. Standardized die sets are also described. Address requests to E. A. BAUMBACH MFG. CO., Dept. 14, 1812 South Kilbourn Ave., Chicago 23, Ill., or use INFORM-A-GRAM Key No. J14-Z.

MILLING A HARDENED STEEL DIE measuring approximately 62 Rockwell C is possible with Precise 40 and a tungsten carbide cutter. Operating at 40,000 RPM, the Precise 40 is a lightweight, electric handtool and portable grinder designed for industry, with a ⅕ HP motor, in 40 oz. of tool weight. It is a strong tool, built for high-speed, precision work on almost any material; uses include grinding, milling, deburring, small diameter drilling, finishing and polishing. Complete data is given in illustrated literature. Write PRECISE PRODUCTS CO., Dept. 21, 1328-30 Clark St., Racine 1, Wis., or use INFORM-A-GRAM Key No. B21-Z.

MEASURING ACCURACY TO 2, 4 or 8 MILLIONTH-INCH becomes a reality with "Jo-Blocks" made and sold by Ford Motor Co., Johansson Division. Hardened, ground, stabilized and finished to specific size, these gages have three basic uses: master laboratory standards, actual working gages and as tools for laying-out and scribing finer work. A 16-page folder illustrates a few of the hundreds of common uses and lists standard sets and accessories. Address request and inquiries to FORD MOTOR CO., JOHANSSON DIVISION, Dept. 25, 3650 Schaefer Rd., Dearborn, Mich., or use INFORM-A-GRAM Key No. C25-Z.

SPECIAL TYPE OF HIGH MANGANESE, high sulphur analysis steel plate, developed especially for applications involving machining such as the production of rubber molds, machine parts, die bases, etc., is described in an illustrated 8-page bulletin, "E-Z-Cut Plates," published by Joseph T. Ryerson & Son, Inc., steel distributors. The literature gives analysis, physicals and explains machining advantages; how to weld and properties developed by case carburizing. Address requests for copies to JOSEPH T. RYERSON & SON, INC., Dept. 4-51, P. O. Box 8000-A, Chicago 80, Ill., or use INFORM-A-GRAM Key No. 451-Z.

OPERATING ON A NEW PRINCIPLE OF GRAVITY FEED, the Roll-In metal-cutting band saw acts as two machines. As a cut-off saw with gravity feed, the blade rolls into the work, saving wear on blades since correct pressure is automatic. For contour work the blade is locked in a stationary position with a clamp, permitting the cutting of any shape, size or kind of metal and plastic. Recent literature contains many outstanding features which show how to cut time and reduce labor. Request copies from ROLL-IN SAW CO., Dept. 28, Parma, Mich., or use INFORM-A-GRAM Key No. L28-Z.

OUTSTANDING IMPROVEMENTS IN PNEUMATIC TOOLS AND EQUIPMENT produced by M-B Products which have proved profitable are contained in bulletins available for various products. Four models of portable pneumatic grinders are described: Super-Speed, with either ⅛", $\frac{3}{16}$" or ¼" hole in spindle; Junior; Utility; and Heavy-Duty. Literature on the following is also available: bench type pneumatic grinder, air line filters,

automatic air line lubricators and combined air line filters and automatic lubricators. Complete data and prices are included. Address requests to M-B PRODUCTS, Dept. 86, 130-134 E. Larned St., Detroit 26, Mich., or use INFORM-A-GRAM Key No. A86-Z.

A SIMPLE AND SURE WAY OF REDUCING DIE COSTS is offered with a line of standardized piercing punches, button dies and retainers which are reviewed in catalog C-4, issued by Hovis Screwlock Co. The Hovis screwlock principle is fully explained with a self-explanatory diagram. Specifications and sketches of the different series of retainers, punches and button dies can serve as a purchasing guide. Individual bushings, standard lock screws and retainer assembling jig are also described and illustrated. Request this catalog from HOVIS SCREWLOCK CO., INC., Dept. 1-35, 8101 E. Nine Mile Rd., Van Dyke, Mich., or use INFORM-A-GRAM Key No. 135-Z.

WIDELY USED IN THE WORKING OF SHEET METAL, three models of presses are reviewed in literature issued by Colonial Broach Co. "Junior" bench type presses, made in three sizes intended primarily for light and medium duty assembly and broaching work (bulletin VJ1-44); "Utility" hydraulic presses adaptable as general purpose presses (bulletin VBS-46); and "Assembly" presses for performing a wide range of assembly operations (bulletin PA-47). All are illustrated and described in attractive individual folders with specifications and accessories included. Address COLONIAL BROACH CO., Dept. 26, P. O. Box 37, Harper Station, Detroit 13, Mich., or use INFORM-A-GRAM Key No. 26-Z.

RETURN SCRAPPED FORGING DIES TO USEFUL SERVICE after welding with Eureka "Drawalloy" No. 340 and 240 welding electrodes. Recommended for welding and repairing deformed, broken or spalled areas on hot or cold forging dies of all types; changing contours and to eliminate the use of inserts; and among many other uses they also provide excellent drawing, forming, forging and bearing surfaces. Detailed information on these electrodes and others is available in current literature titled "Eureka Alloy Welding Electrodes". Write to WELDING EQUIPMENT AND SUPPLY CO., Dept. 5-80, 224 Leib St., Detroit 7, Mich., or use INFORM-A-GRAM Key No. 580-Z.

ADOPTION OF A NEW QUANTITY PRICING SYSTEM on grinding wheels, incorporating many advantages over the old, cumbersome schedule of discounts, is announced by Chicago Wheel and Mfg. Co. Complicated calculations are unnecessary in selecting proper abrasive products for any job and determining their price. This new system of pricing has been heartily endorsed by purchasing agents. Copies will be sent on request from CHICAGO WHEEL & MFG. CO., Dept. 6-42, 1101 W. Monroe St., Chicago 7, Ill., or use INFORM-A-GRAM Key No. 642-Z.

COMPLETELY PORTABLE, ENTIRELY SELF-CONTAINED, a 20 ton gap frame hydraulic press, with the mechanism built into the press frame proper, is announced by the Northern Tool and Machine Co. Of all steel welded construction, this compact unit occupies only 18" x 36° floor space. Recent illustrated literature describes its 12" stroke, hard chrome finished ram, Northern control valve and single pedal control; also contains specifications with a diagrammatic sketch. Request copies from NORTHERN TOOL AND MACHINE CO., Dept. 30, 1120-24, North 31st Ave., Melrose Park, Ill., or use INFORM-A-GRAM Key No. G30-Z.

NEW DESIGN FEATURES of the highly versatile Knight millers (made in three sizes), which assure increased production, convenience of operation and maximum return on investments, are given in Catalog 5-45, published by W. B. Knight Machinery Co. Actual photos illustrate how the balanced qualities, rigidity, accuracy, versatility, accessibility and capacity of the machine adapt it to many types of work. Construction details are described along with diagrams; general specifications and accessories complete this informative catalog. Obtain copies from W. B. KNIGHT MACHINERY CO., Dept. 3-51, 3920 W. Pine Blvd., St. Louis 8, Mo., or use INFORM-A-GRAM Key No. 351-Z.

PRECISE REPRODUCTION OF MOLD CAVITIES and die forms in three dimensions, or profiling in two dimensions, is assured with the Pratt and Whitney-Keller type BL milling machines, controlled by a sensitive tracer and operated by simple electrical circuits. Examples of various types of masters are illustrated in Circular No. 4900, as well as construction details, special equipment and attachments. Write for copies which include specifications of two sizes to PRATT & WHITNEY, Dept. 4-30, West Hartford 1, Conn., or use INFORM-A-GRAM Key No. 430-Z.

AUTOMATIC PUNCH PRESS PRODUCTION is offered with Dickerman Hitch feeds. Simple in design and construction, adaptable without alteration to any ordinary type of press, with positive feed control feature, they are especially advantageous on short runs, for setup time is only a fraction of that required by other types of feeds. Recent literature contains many typical feed applications, operating principles, detailed illustrations and specifications. Obtain copies from H. E. DICKERMAN MFG. CO., Special Tool Developments, Dept. 2-70, 321 Albany St., Springfield, Mass., or use INFORM-A-GRAM Key No. 270-Z.

Fray "ALL-ANGLE" MILLING ATTACHMENT

EASY TO HANDLE
FLEXIBLE
UNIVERSAL • STURDY

It is an all purpose attachment which has thoroughly proved itself all over the world. Ideal for the making of plastic molds, die casting molds, permanent mold casting molds, metal patterns, tool and die making, production work of all kinds, as well as for grinding, drilling, boring, etc.

DIRECT DRIVE OR BACK GEARED
8 SPINDLE SPEEDS 125 TO 5200
For further information write Dept. M

NATIONAL DISTRIBUTORS
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE 4, R. I.
AGENTS IN ALL PRINCIPAL CITIES

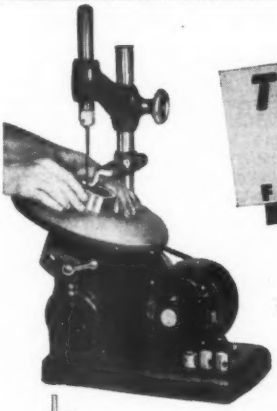
DESIGN FASTER..BETTER

Better Tools at Lower Cost!

Write for Catalog No. 3-7.

Jergens Standard *Aluminum Alloy* Hand Wheels, Hand Knobs and Levers are available from stock in a wide variety of sizes . . . for every need. Uniform and engineered to the highest standards, they offer maximum efficiency to tool and machine design. Write today for the Jergens Template Catalog and Price List.

Jergens TOOL SPECIALTY CO.
712 E. 163rd ST. • CLEVELAND 10, OHIO



TRIPLE PURPOSE MACHINE
FILES . . . SAWS . . . STONES

ILLINOIS DIE FILING MACHINE

An accurate, smoothly-operating machine that files, saws and stones the most intricate die shapes . . . eliminates tedious hand operations . . . reduces costs. It is quality-built for long, trouble-free service . . . hardened and ground shafts running in bronze bushings minimize wear. The holding chuck and clamping device provide perfect file alignment.

Sawing

Stoning

Write for descriptive literature.

ILLINOIS TOOL WORKS
2501 N. Keeler Ave. • Chicago 39, Ill.
MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

PUBLICATION PREVIEWS

SPECIFICATIONS OF PRECISION ANTI-FRICTION DIE SETS, ball or roller bearing type, are presented in a current bulletin published by Lempco. An index giving die area, punch and die holder thickness, guide-pin diameter, guide bushing, shut height and dimensional data, is supplemented by diagrammatical sketches and other information. Request this handy guide from LEMPCO PRODUCTS, INC., Dept. 5-40, 5713 Dunham Rd., Bedford, Ohio, or use INFORM-A-GRAM Key No. 540-Z.

HOW TO REDUCE COST AND INCREASE THE CAPACITY of die and mold making departments without skilled diemakers is analyzed in a recent publication, form 1319F, issued by George Gorton Machine Co. Illustrated examples of typical die, mold and production profiling operations are shown with average time reductions. A change-over feature on all models is also offered; that is by detaching the duplicator table. In 5 minutes' time the machine is converted into a standard all-purpose, high speed vertical miller. Specifications of all models are also included in this 12-page catalog. Write to GEORGE GORTON MACHINE CO., Dept. 7-11, Racine, Wis., or use INFORM-A-GRAM Key No. 711-Z.

EIGHT MORE PAGES OF VALUABLE INFORMATION for Bellows Foto Fact File are now available. Facts and illustrations of typical operations using "Controlled-Air" powered motors, feeds and power dome air cylinders and how they can increase production and decrease labor cost are given. Case histories giving details, comments and equipment used in each operation offer many suggestions of modernizing present machines. Secure copies from THE BELLOWS CO., Dept. 8-39, 798 North Main St., Akron 10, Ohio, or use INFORM-A-GRAM Key No. 839-Z.

RAPID AND ACCURATE FILING, SAWING AND LAPPING is assured with Oliver Die Makers, Model S-1. An entirely new type of chuck is provided which offers accurate alignment. The table tilts in four directions; the overarm eliminates the need of hold down pinion shaft through an improved Universal brackets, fingers and file lever. These machines are direct motor driven, connected to pinion shaft through an improved Universal Coupling. Other features are listed in illustrated literature available from OLIVER INSTRUMENT CO., Dept. 6-97, 1436 E. Maumee, Adrian, Mich., or use INFORM-A-GRAM Key No. 697-Z.

ON SURFACING JOBS WHERE THE CONTACT IS BROAD, or where requirements call for an especially heavy removal of stock, extra coolness of cut is assured with Koolpore wire-wound abrasive cylinders. Flaring cup wheels, saucer type, typical straight type, and segments in any shape are manufactured by Bay State Abrasive Products Co., for various surfacing operations. Available literature contains illustrations and discusses outstanding features of the five types, tool and cutter recommendations as well as surfacing recommendations. Write to THE BAY STATE ABRASIVE PRODUCTS CO., Dept. 2-05, 1 Union St., Westboro, Mass., or use INFORM-A-GRAM Key No. 205.5-Z.

UP-TO-THE-MINUTE INFORMATION on the use of soft rubberized abrasives for light grinding, deburring, finishing and polishing is now available in a new catalog, "Cratex Industrial Division", obtainable by writing the CRATEX MANUFACTURING CO., Dept. 21, 81 Natoma St., San Francisco 5, Calif., or use INFORM-A-GRAM Key No. E21-Z.

TEMPERING IN SURFACE COMBUSTION STANDARD RATED FURNACES is described in a new 4-page bulletin, No. SC-133, issued by Surface Combustion Corp. Forced convection, oven and pot type furnaces, recommended for tempering of various kinds and shapes of ferrous objects, are illustrated and discussed. Detailed cut-a-way drawings show heat flow in forced convection furnaces and the principle of Conjecto-Firing. Obtain this descriptive literature from SURFACE COMBUSTION CORP., Dept. 8-10, Toledo 1, Ohio, or use INFORM-A-GRAM Key No. 810-Z.

IDEAL FOR ALL SHAPER WORK OF 7" STROKE OR LESS, Ammco precision shaper is a machine of a thousand uses. Countless jobs can be done accurately, quickly, easily and economically, for it has the accuracy and operating features of larger shapers. When mounted on a portable cabinet it can be rolled to the mechanic's work, saving steps and time. Illustrated literature shows a wide variety of work which can be done on the shaper. Construction features and specifications are also included. Secure copies from AMMCO TOOLS, INC., Dept. 1-97, 2100 Commonwealth Ave., North Chicago, Ill., or use INFORM-A-GRAM Key No. 197-Z.

PRECISION FILING OF INSIDE SURFACES of a square hole cut into a small punching die, sawing an internal slot in a flat die block, lapping or trimming operations can be efficiently and economically accomplished with the Milwaukee die filer. Reciprocal filing at its best, promotes precision workmanship, saw overarm quickly attached, convenient and adaptable, are principal features discussed in a current bulletin available from MILWAUKEE CHAPLET & MFG. CO., Dept. 5, 1029 South 40th St., Milwaukee 4, Wisconsin, or use INFORM-A-GRAM Key No. A5-Z.

A SIMPLE, EFFECTIVE METHOD OF REMOVING DIE SET PUNCH HOLDERS from die

THIS FIVE-IN-ONE TOOL IS

THE HANDY MAN

OF THE SHOP

HEINRICH NO. 5

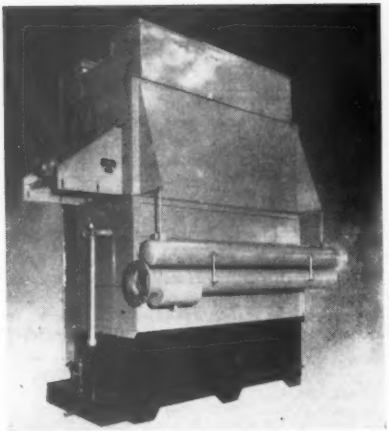
HANDNIB

• OUTSIDE NIBBLER • SHEAR
• INSIDE NIBBLER • PUNCH
• ROD CUTTER

Imagine! One tool that can be used *five* different ways. This most versatile of the Heinrich line is Heavy Duty Handnib No. 5. It's a toolmaker's delight, for it eliminates hours of tedious hand-work in making templates and trial blanks of any shape desired. In addition to its nibbling (ouside and inside) and shearing of steel up to 3/16" thick, the No. 5 Handnib punches up to ½" holes through ⅛" stock and cuts drill rods or round stock up to ⅜" diameter. Write today for folder giving full details on this and other Handnib models.

NATIONAL MACHINE TOOL CO.

DEPT. 137-G • RACINE, WISCONSIN



NIAGARA Aero After Cooler Saves Expensive "Wear Out" of Air Tools

• Water in compressed air lines is more than a nuisance; its cost is thousands of dollars yearly in worn-out tools and equipment, or broken air tools caused by water hammer, abrasion and washed-out lubricants.

Protect your air tools and compressed air processes with drier compressed air... using the NIAGARA AERO AFTER COOLER. Based on the evaporative cooling principle, it always keeps the air in compressed air lines below the relative surrounding temperature, preventing condensation and, under the least favorable conditions, provides air with one-third to one-half the moisture content of water-cooled air.

Water savings will pay for the installation. Write for Bulletin 98-TD.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

405 Lexington Ave. New York 17, N. Y.

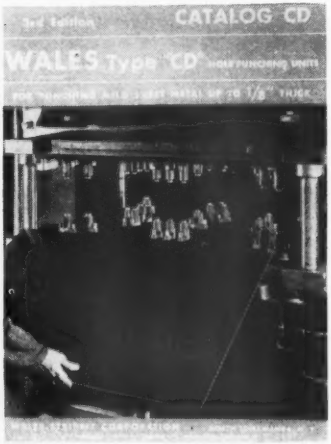
Field Engineering Offices in Principal Cities

NIAGARA

AIR ENGINEERING EQUIPMENT

beds with guide pins and separating assembled punches and dies has been devised by the Producto Machine Co., designers of the Producto Punch Holder Remover. Invaluable to every tool and die manufacturer, it offers possibilities for shearing in small punches and dies and tryout work on light gauges of material. A complete description, its use and capacity, together with specifications, are given in literature available upon request from THE PRODUCTO MACHINE CO., Dept. 91, 990 Housatonic Ave., Bridgeport 1, Conn., or use INFORM-A-GRAM Key No. 91-Z.

FOR QUICK POSITIONING AND EASY ALIGNMENT of burr-free hole punching, Wales-Strippit Corp. offers type "CD" units and patented mounting methods which reduce press down time to a matter of minutes.

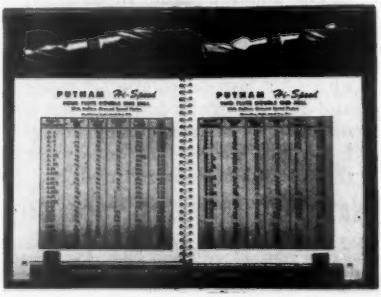


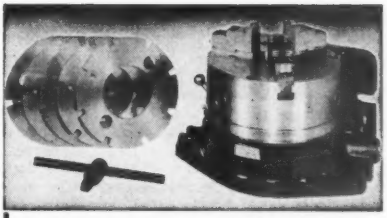
Available in four sizes to punch holes up to 1⅛" diameter in ⅛" thick mild steel, each punch and die assembly is independent and self-contained. Complete information on how units are put in operation and time and money saving features are given in a 16-page illustrated catalog. Sketches of various sizes with price lists are included. Request copies from WALES-STRIPPIT CORP., Dept. 60, 355 Payne Ave., North Tonawanda, N. Y., or use INFORM-A-GRAM Key No. 60-Z.

FOR FASTER FINISHING IN THE DIE SHOP, Severance Tool Industries, Inc., contributes their ground carbide die machine files with the definite advantage of rapid cutting on hardened dies. Where it is possible to take advantage of the additional power and speed of a rotating power means, Severance carbide midget mills are recommended in die grinders at grinding speeds. Illustrations and specifications of these files and mills are

included in four groups of Severance tools which are reviewed in Catalog No. 16; midget mill, deburring, tubing cutter, countersink and miscellaneous group. Get copies from SEVERANCE TOOL INDUSTRIES, INC., Dept. 4-61, Saginaw, Mich., or use INFORM-A-GRAM Key No. 461-Z.

OVER 800 DIFFERENT STANDARD END MILLS, comprising the complete Putnam Hi-Speed line, are illustrated in Catalog No. 44, published by Putnam Tool Company, of Detroit. Each type of end mill is illustrated in two colors, with prices and complete specifications given for each size of tool. Cataloged, too, are 200 other metal cutting tools which include the complete lines of Putnam Hi-Speed chucking reamers, continuous pilot counterbores, end mill holders and adapters. All of these, too, are illustrated and described in detail. In addition, are illustrations and





Super-Spacer and Equipment

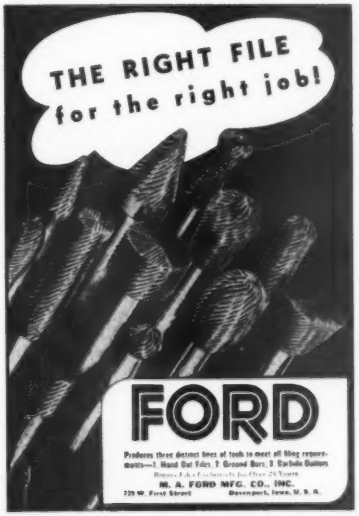
Greater Speed With Accuracy

HARTFORD "SUPER-SPACER"

So many different jobs can be done more economically with the Hartford Super-Spacer that it will pay you to investigate its possibilities for your shop. Standard equipment includes mask plates, reversible jaw self-centering chuck, sliding handle chuck wrench. It's moderate in cost. Write for illustrated applications bulletin.

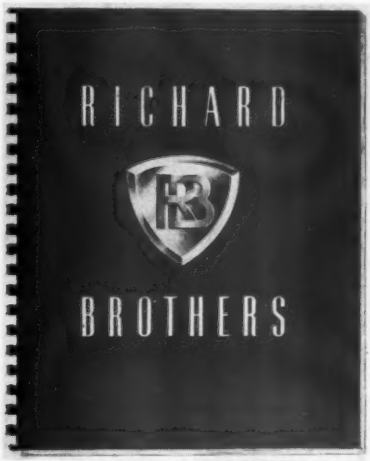
THE HARTFORD SPECIAL MACHINERY CO.

It stands to reason: your best chance of finding the *right* blade — the blade that'll cut down "rejects" and replacement cost — is offered by a complete line . . . the Star line. Your Star supplier can give you a wide choice. He has a Star blade for every job a hack saw or band saw can do. No matter what you're cutting — metals, plastics or other non-metallics — he can furnish you with the Star that'll cut it cleaner, faster, better — the *right* blade to cut costs for you.


THE RIGHT FILE
for the right job!
FORD
Produces three distinct lines of tools to meet all filing requirements—1. Hand Cut Files, 2. Ground Burs, 3. Carbide Cutters
M. A. FORD MFG. CO., INC.
720 W. Front Street
Davenport, Iowa, U. S. A.

specifications of the Putnam Universal grinding fixtures. Of special interest to cutting tool users and shop men are the pages devoted to engineering data. The cover of the book is of light blue textileather, die-stamped in silver and contrasting dark blue foil. Inside pocket of the slipcover holds the body of the book which is spiral wire bound, permitting the pages to lie flat wherever opened. Write to PUTNAM TOOL COMPANY, 2981 Charlevoix Ave., Detroit 7, Mich., or use INFORM-A-GRAM Key No. A80-Z.

COMPLETELY STANDARDIZED INTERCHANGEABLE PUNCHES AND DIES are featured with full descriptive information and specifications in latest catalog of Allied Products Corp. All types of R-B interchangeable punches and dies in varied standardized shapes and sizes are illustrated and described, as well as retainers, backing



plates, guide pins, bushings, dowel pins, rubber strippers, accessories and die makers' supplies required for production punching setups. Shown also are various standard R-B composite die sections and a few examples of special punches, dies and special retaining plates typical of the types which can be produced by Richard Brothers to individual requirements. A section of the catalog carries technical data of considerable value to those responsible for processing production in the metalworking and plastics industries. For a copy write ALLIED PRODUCTS CORP., RICHARD BROTHERS DIV., Dept. 59, 4634 Lawton Ave., Detroit 8, Mich., or use INFORM-A-GRAM Key No. F59-Z.

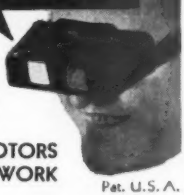
A GUIDEBOOK FOR SAVING TIME AND PRODUCTION STEPS and for reducing costs in finishing products of metal, plastics, wood and other materials are presented in the new Brightboy catalog No. 57. The catalog demonstrates in text and by actual-use illustrations, a wide variety of industrial applications of Brightboy rubber cushioned abrasives, and offers data essential to modern product finishing including techniques, abrasive textures, machine speeds, and specifications. Write to BRIGHTBOY INDUSTRIAL DIVISION, Weldon Roberts Rubber Co., Dept. 6-68, 351 Sixth Ave., Newark 7, N. J., or use INFORM-A-GRAM Key No. 668-Z.

NOW AVAILABLE AS AN AID IN ORDERING TOOLS AND PRESSROOM SUPPLIES and equipment is an indexed 25-page (loose leaf) leatherette bound catalog, offered by Durant Tool Supply Co. Illustrations, descriptions and charts giving specifications of various necessary information enable quick selection of proper size and type of products which include: screws, pipe plugs and dowel pins, die sets, pressroom machinery, springs and productimeter counters. Obtain this catalog from DURANT TOOL SUPPLY CO., Dept. 8, 155 Orange St., Providence 3, R. I., or use INFORM-A-GRAM Key No. J8-Z.

IN THE CAPACITY OF RIVETING SPECIALISTS, The High Speed Hammer Company, Inc., offers, without cost or obligation, the advantages of an engineering service, replete with riveting data and experience, gained through years of activity in this specialized field. Detailed information is available in a 40-page circular, which explains the correct method of riveting improved by speed and power of the high speed riveting hammers. Descriptive drawings and photographs of the various models of riveting hammers as well as riveting tools are also included. Secure copies from THE HIGH SPEED HAMMER COMPANY, INC., Dept. 32, 313 Norton St., Rochester 5, N. Y., or use INFORM-A-GRAM Key No. L32-Z.

DRILLING, COUNTERBORING AND COUNTERSINKING STEELS hardened by any method to any hardness, is possible with Hardsteel drills, developed and produced by Black Drill Co. The necessity of annealing before drilling is eliminated, as well as re-hardening and re-machining. Illustrations in current literature show standard Hardsteel triangular shape drills with a small groove at the point for chip clearance and round shank. Typical applications, recommended drilling speeds, drilling procedure, grinding, drill sizes, hardness conversion table and many other pertinent facts are included in the 24-page publication. Request copies from BLACK DRILL CO., DIV. OF BLACK INDUSTRIES, Dept. 5-88, 1368 E. 222nd St., Cleveland 17, Ohio, or use INFORM-A-GRAM Key No. 588-Z.

SEE BETTER
with a
MAGNI-FOCUSER



The Best Eye Aid for

- LATHE WORK
- BENCH WORK
- SAW FILING
- REWINDING MOTORS
- TOOL AND DIE WORK

Pat. U.S.A.

EVERYONE in your plant who does precision work can do it *easier, faster, safer, better* by wearing a Magni-Focuser. This *binocular* eye-loop enables you to see an object *sharply magnified* with the comfort and clarity of normal vision. Relieves eye-strain—lessens fatigue—reduces accidents. *Allows free use of both hands.* Available in different magnifications, from 2¼ at $8.50 to 3½ at $10.50. If your distributor cannot supply you, order direct. Money refunded if Magni-Focuser does not help you to *see better.*

EDROY PRODUCTS CO.
476 Lexington Avenue • New York 17, N.Y.

On metal, wood, glass, plastics

FOR FINE DETAILS
• CLOSE TOLERANCES
• PRECISE FINISHING

A WHOLE SHOPFULL OF TOOLS IN ONE

Machinist-craftsmen find it unsurpassed for grinding, drilling, routing, carving, sanding, polishing and 9,994 other uses. Precision-engineered, AC-DC, with more exclusive features than any other tool.

Exclusive finger-grip brings hand closer for finer work

Complete with 14 accessories in fitted steel case

$22.50

$32.95 value if purchased separately

CASCO Electri-Craft Tool Kit
CASCO PRODUCTS CORPORATION • BRIDGEPORT 2, CONN.

CRITERION *Boring Heads*

Original Accuracy *Maintained*

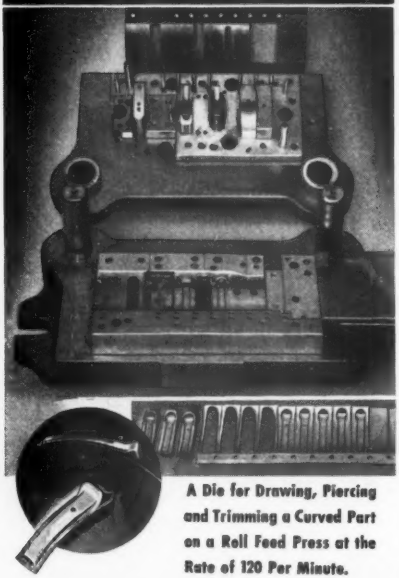
Noted for maintaining original accuracy over a longer period. Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

Write: Attention Dept. C

Lead Screw ground from solid AFTER hardening.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

FEDERAL FACILITIES



A Die for Drawing, Piercing and Trimming a Curved Part on a Roll Feed Press at the Rate of 120 Per Minute.

Quality Tools such as this die, reduce production costs by combining many operations in a single tool.

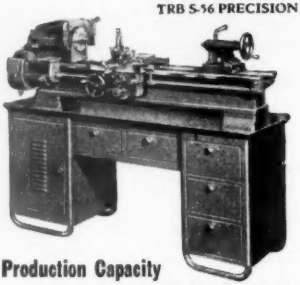
Federal equipment, with latest modern techniques and skilled personnel are available for building all types of Dies, Jigs, Fixtures, Molds and Special Tools.

Let us quote on your tooling requirements.

FEDERAL TOOL CORPORATION
401 N. Leavitt Street
CHICAGO 12, ILLINOIS

SHELDON

TRB S-56 PRECISION LATHES



Production Capacity

. . . comes ready for production

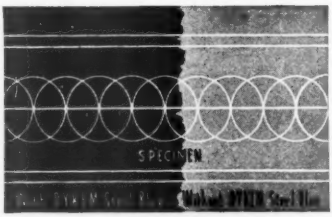
The new TRB S-56 Sheldon Precision Lathes have the speed, stamina and capacity for general production use—11¼" swing, 1⅜" hole thru spindle, 1" collet capacity. They will operate safely at high speed and work to the very closest tolerances. FOR SPINDLE BEARINGS ARE "ZERO PRECISION" tapered roller bearings, the most accurate obtainable.

They will take a "healthy cut" too, because they have double V-belts to the spindle to assure full power from their 1 h.p. motor at the point of work. They come ready for production—no breaking-in period is required—start earning from the day received.

Write for Catalog of Sheldon and Sheldon-Vernon.

SHELDON MACHINE CO. Inc.

4236 N Knox Avenue Chicago 41, Illinois, U. S. A.



DYKEM STEEL BLUE

STOPS LOSSES

making dies and templates

Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY

2303L North 11th Street St. Louis, Mo.

A TDJ FEATURE PRESENTATION **DIES AND STAMPINGS**

SHOP AIDS

For You And Your Job

Use our postage-free Inform-a-Gram for your requests.

A CONVENIENT REFERENCE AND PURCHASING GUIDE published by Grobet File Co. of America lists 3,566 different patterns, sizes and cuts of Grobet Swiss hand and machine files and rifflers in a new 24-page tabloid catalog which also describes countersinks, rotary and deburring files. Selecting these Swiss files which are known for their

extreme hardness and durability becomes a simple matter. Copies are available from Grobet File Co. of America, Dept. 7-05, 421 Canal St., New York 13, N. Y., or use INFORM-A-GRAM Key No. 705-Z.

AN INFORMATIVE REFERENCE BOOK, offered by Durable Punch & Die Co., shows many operations that were formerly drilled, milled or broached but are now, and have been for ten years, successfully pierced with Durable patent piercing punch, enabling quantity, high-quality, and low-cost production. Drawings of different die constructions, designed by some of the highly experienced die and tool designers in various branches of the metal fabricating industry, are shown. Detailed data, specifications, and application of the complete line of piercing punches, stripper guides and die buttons are discussed as well as valuable piercing information. Obtain this book from Durable Punch & Die Co., Dept. 30, 1214 W. Madison St., Chicago 7, Ill., or use INFORM-A-GRAM Key No. L30-Z.

PHYSICAL PROPERTIES OF DIE STEEL, produced by Crucible Steel Co. of America, are simply presented in current publications of "Data Sheet". Five issues analyze the following: Nu-Die and Nu-Die V die casting die steel, for aluminum and magnesium; CSM #2 die casting die steel, developed to meet the requirement for zinc base die casting dies and holder blocks; Airkool die steel, for applications which demand toughness and fairly high abrasive resistance; Formold, an electric furnace alloy cold hubbing mold steel. Each is described, with valuable facts as to its machinability, critical temperature, forging, annealing, hardening, tempering, and other pertinent facts. Obtain these data sheets from Crucible Steel Company of America, Dept. 2-56, 405 Lexington Ave., New York 17, N. Y., or use INFORM-A-GRAM Key No. 256-Z.

"SURFACE BROACHING" is a recently completed sound film giving a graphic demonstration of how effectively this operation is accelerating the production of many everyday products. Running approximately 18

minutes, this 16 mm informative film, available for exhibition, includes broaching of loom frame ends, flat iron bases, automobile bearings, wrenches, pliers and automobile cylinder blocks. Many of the scenes were taken on the job in several of the country's finest industrial plants. Interested groups may write for further information to La-Pointe Machine Tool Co., Dept. W-51, Hudson, Mass., or use INFORM-A-GRAM Key No. 714-Z.

TO HELP OBTAIN THE MAXIMUM USE AND CUTTING PERFORMANCE of twist drills, Republic Drill & Tool Co. has prepared manual G-1 as a guide to correct point grinding and web thinning. This handy 24-page booklet titled "Drills, How to Sharpen Them" contains numerous diagrams of right and wrong methods of sharpening; illustrations and descriptions of correct freehand web thinning and machine pointing of shankless drills, and a list of 4 valuable books which are also available upon request. Get copies from Republic Drill & Tool Co., Dept. 4-40, 322 South Green St., Chicago 7, Ill., or use INFORM-A-GRAM Key No. 440-Z.

APPROXIMATELY 200 APPROVED STANDARDS COVERING SAFETY AND INDUSTRIAL HEALTH, formulated by industrial representatives, are listed in a 20-page booklet, now available from American Standards Association. A brief description of their contents is given, which enables those interested in a particular field to locate specific standards; code number and prices are included. Provisions included represent a crystallization of the accumulated wisdom on industrial experience and are the result of painful trial and error, then adopting the best methods of meeting the technical problems of safety. Request copies from American Standards Association, Dept. 7-93, 70 East Forty-Fifth St., New York 17, N. Y., or use INFORM-A-GRAM Key No. 793-Z.

COMPREHENSIVE FACTS ON "SHARPENING", or how a wheel should be dressed, are briefly explained with cartoon sketches, informative diagrams, and illustrations of diamond dressing tools, in a novel booklet "For Grinder Men Only" published by Koebel Diamond Tool Co. The importance of proper truing and dressing of grinding wheel, selection of the correct grinding wheel as well as the right truing tools are discussed. Look out for vibration, be careful not to bump tools against the wheel, correct position of tool, take light cuts, be sure to use a "drag" angle, are some suggestions given in this quick reference manual. Address requests to Koebel Diamond Tool Co., Dept. 5-65, 9456 Grinnell Ave., Detroit 13, Mich., or use INFORM-A-GRAM Key No. 565-Z.

★ ★ ★ ★ ★ ★

SAVE UP TO *60%* OF DIE SETTER'S TIME WITH LEMPCO ANTI-FRICTION DIE SETS

Licensed under inventions of Guy Conner

Lempco's Pre-Loaded Anti-Friction Guide Pin Bearings absolutely prevent any lateral motion between pins and bushings. As a result, they provide the following 6 advantages. Check them carefully. Each of them will play an important role in assuring the quality of your products and reducing costs.

1. **Perfect alignment of punches and dies.**
2. **Precise parallelism of punch and die holder.**
3. **Die sets can be opened and closed by hand . . . saves up to 60% of die assembly time.**
4. **Eliminates galling or seizing of pins and bushings which reduce costly downtime.**
5. **Insures greatly increased die life.**
6. **Positively eliminates all lubrication problems.**

Write for fully illustrated booklet, "Facts About Lempco Anti-Friction Precision Die Sets."

LEMPCO

5713 DUNHAM ROAD ★ BEDFORD, OHIO, U. S. A.

HAVE YOUR MOLDS SUPER-POLISHED!

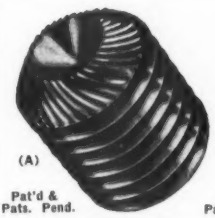
End Polishing Headaches in Tool Rooms Get Perfectly Finished Molded Parts

Using our own equipment and special methods, we will polish your molds better, faster, more economically. Acme's lapping and optical polishing procedure produces flawless, mirror-finished surfaces, free from waves or "lemon-peel" effect. Surface imperfections are removed, not covered up. Corners are held sharp, curves finished true. Any specified tolerances will be held. Molds can be handled in any form or stage. Also dies. Service is fast, cost is low. Write for details . . . better still, send us your molds at once.

ACME

SCIENTIFIC COMPANY

1452 W. Randolph • Chicago 7, Illinois



(A)

Pat'd & Pats. Pend.

(B)

Pat'd & Pats. Pend.

Knurling of Socket Screws originated with "Unbrako" In 1934.

Kits: Pats. Pend.

You can't tighten (or loosen) socket screws without a hex socket wrench, so why not get our No. 25 or No. 50 "Hallowell" Hollow Handle Key Kit which contains most all hex bits.

UNBRAKO

Reg. U. S. Pat. Off.

Self-Lockers

stay put, regardless of the most chattering vibration . . . .

The "Unbrako" Socket Set Screw (A) with Knurled Cup Point is a Self-Locker whose point digs-in and stays dug—regardless of the most chattering vibration. Yet, it can be backed-out with a wrench and used over and over again. The "Unbrako" Socket Set Screw with Knurled Threads (B) is a most excellent Self-Locker, too, because the knurling, as shown, swages the threads when locking results. To be used with points such as: flat, dog, cone and oval which do not lend themselves to knurling. In sizes from No. 4 to 1½" in diameter . . . millions in use. Write for the "Unbrako" Catalog of Socket Screw Products.

"Unbrako" and "Hallowell" Products are sold entirely through Industrial Distributors.

OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 600 BRANCHES: BOSTON · CHICAGO · DETROIT · INDIANAPOLIS · ST. LOUIS · SAN FRANCISCO

Temporary Dies, Methods And Applications

The tooling theory and practice that is involved in the design and use of temporary and semi-permanent dies is exactly comparable to the applications of job simplification that were so important to production during the war.

The entire schedule for machine tool production of a given workpiece was so thoroughly broken down, divided and sub-divided, that the resulting operations were of such basic simplicity that inexperienced workers were able to perform those operations with a minimum of training.

Temporary dies result from the same approach to the production of a stamping. Even though a variety of pierced holes and several forming operations may be required in addition to blanking, the several operations are considered individually and the most simple, but efficient, tooling is employed for each operation.

The greatest economic justification for this procedure is in the case of short runs where but a few dozen or hundred pieces may be required. In some cases, however, the initial cost of the semi-permanent tooling and the cost per piece, due to highly-skilled and efficient press operators, is so low that press runs of many thousands can be produced favorably, dollarwise, in comparison to the cost of permanent, high production tooling.

Shown in Figure 1 are some of the most basic and standard tool elements that may be incorporated in temporary dies; tools that produce V-bends, U-radii and offset forms. Equally simple are the tools for individually piercing round, square or irregularly shaped holes, slots and notches.

The workpiece in Figure 2 is an example of several advantages of tem-

by Stan Wochnik
President
WLS Stamping Company
Cleveland 4, Ohio

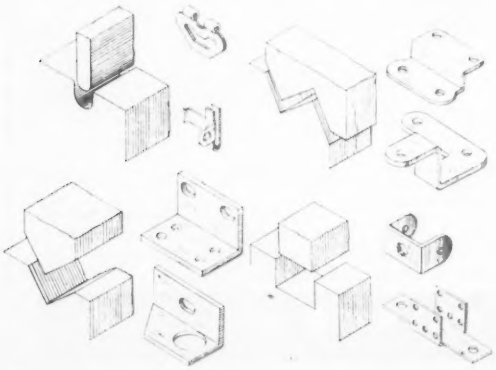


Fig. 1. Simple tooling setups as shown here can be adapted to an infinite variety of specifications. Punches and dies are graduated in size, and forming tools are adjustable to stock thickness. Where springy materials are used, the dies can be shaped to allow for spring-back.

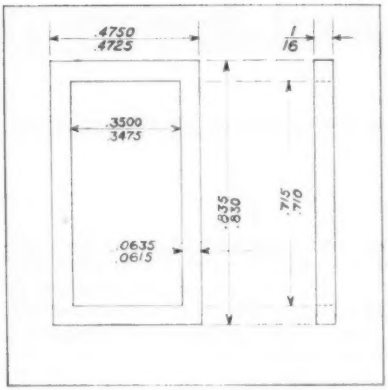


Fig. 2. A temporary compound die for this piece cost only $100.00.

porary tooling. It constituted an electrical instrument part, blanked out of soft temper copper stamping stock. The dimensional tolerances were close and quality requirements were high. The legs of the hollow rectangle were of square cross-section, i.e., same width as the stock thickness. They had to be held truly flat; no dishing or cave-in. Obviously, a job for a compound die because any hand-tailored, "custom-built" shaping of this piece would have been prohibitive in cost; but the quantity required was only fifty.

The end result was the building of a temporary compound die for $100.00 and the production of the 50 pieces for less than 4¢ each additional. Such nominal costs are in line with product development during periods of inevitable engineering changes. However, after final dimensions were determined, the same type of temporary compound die was used in turning out nearly 20,000 pieces at a rate of 145 per hour. This was after the customer had experienced corner splitting trouble with his own permanent compound die.

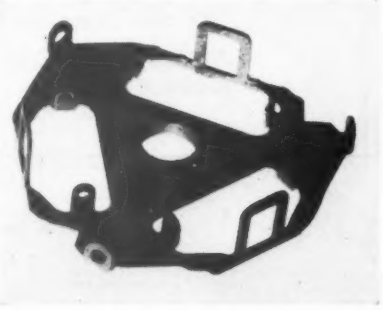
The operations involved in the stamping shown in Figure 3 could easily account for several thousand dollars in tooling costs if it were to be produced on a permanent compound, several-station progressive die.

Following our temporary tooling "job simplification" technique, this job was broken down into the following temporary tooling steps: (1) compound blanking and piercing of rectangular holes; (2) piercing of center hole; (3) extrusion around center hole; (4) forming the six innermost ears; (5) forming up three rectangular ribs and the three window openings; (6) piercing of two small holes on a diameter of the extrusion (and correctly related, angularly, to the six inner ears); (7) piercing holes in six inner ears in accurate relation to the two small holes in extrusion; (8) forming up the three outer ears; and (9) piercing the outer ears in accurate relation to all other pierced holes and forms.

Operations 4 to 9 inclusive were set up on different presses simultaneously and the pieces went from one press to the next throughout the run. This permitted constant inspection of the job during production to catch any variables that might affect the extremely close tolerances specified.

All told, the job simplification technique applied to short run stampings can effect from 25% to 50% savings in tooling and production costs.

Fig. 3. Temporary dies produce intricate pieces through "job simplification". To build permanent tooling for the piece shown below could easily cost several thousand dollars. It would require a compound, several-stage progressive die. The temporary dies used to produce the job consisted of the basic blanking, piercing and forming elements. Accurate press setups and skilled, painstaking operators were equally important factors.



To Tool & Die Journal Readers

There is no other group for whom attendance at the Machine Tool Show is as vital as it is for you. As operational managers of precision metalworking plants, you are in the position of determining which new tooling and production equipment can provide your plant with even better facilities for producing better consumer goods at lower costs.

Therefore, we urge you to visit the Machine Tool Show (September 17-26, Dodge-Chicago Plant). Stay as long as you can. See as much as you can. But by all means, go—even if you can be there only for one day.

And when you go to the show—go with an open mind—receptive to the new ideas presented for the betterment of American Industry of which you are an important member.

Take home all the new ideas you can, then you will be better prepared than ever to perform your function of selecting the new equipment needed by your company to get your costs down and your consumer sales up. Have the courage of your convictions that many of your present machines should be retired in favor of new equipment which will reduce your cost of producing either tools or production parts.

Not every man who would like to go will be able to attend. For those readers, as well as for all others, TOOL & DIE JOURNAL will preview the show in its August and September issues. In October and November we shall review the most valuable ideas, methods and equipment that were introduced.

We hope to see you at the Show.

GEORGE J. HUEBNER
Publisher

To The Machine Tool Show Exhibitors

In September, you're going to have the greatest show on earth.

The contribution you have made to the social and economic progress of our country and to the world at large is so great that it completely defies evaluation money-wise. On September 17th, when you "take the wraps off" your newest models, we hope that it will signal the beginning of another era of great industrial development, one which will carry on American Industry's tradition of bringing more and more of the products for better living within reach of more and more people of modest means.

Thousands of men will visit your show. "They can't all see everything in 9 days." So, to accomplish the greatest good for the greatest number, we suggest that you tell prospective visitors about your exhibit before September 17th. This will enable them to decide what equipment has specific value for them in their work and will permit them to plan positively to see it in the time they have at the show.

TOOL & DIE JOURNAL'S issues in the months of August, September, October and November will be devoted primarily to pre-show information and post-show descriptions of exhibitors' products. In doing this, we believe that our efforts will prove valuable to our readers* and to exhibitors.

To each exhibitor we offer our best wishes for outstanding success. We sincerely hope that the show as a whole will exceed your highest hopes. To a considerable extent, the continuing social and economic progress of our country and of the world depends on your success.

GEORGE J. HUEBNER
Publisher

**Readers include the following Operational Management Personnel:*
General, plant, factory and works managers. Production managers, superintendents and supervisors. Foremen: General, production and maintenance. Tooling engineers, supervisors, foremen and chief inspectors. Chief Engineers and engineering managers. Methods, process, production, planning, time study and quality control engineers. Chief tool and product designers. Research engineers and consultants. Shop owners and partners actively engaged in shop management.

"Hypermatic" High-Velocity Stamping

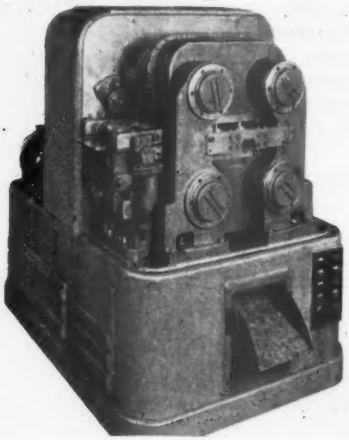
The "HYPERMATIC" has been used in production, first in the Bedford, Ohio, plant of Lempco Products, Inc., manufacturer of the press, and then, for over three years in their subsidiary plant: The Cleveland Pressed Steel Company, a producer of great quantities and varieties of commercial stampings.

During this "shake-down cruise" millions of stampings, ferrous, nonferrous and fibrous, of many shapes, analyses and gauges have been produced at phenomenal speeds.

The "HYPERMATIC" employs a rotary motion in actuating the dies. Four crankshafts are used; the upper two, rotating clockwise, drive the upper die head while the lower pair of crankshafts, counterclockwise in motion, drive the lower die head.

The die members, mounted in Lempco anti-friction die sets, are mounted between the two die heads, the punch holder being fastened to the upper head and die holder to the lower die head. The punches and dies, therefore, have the same rotary motions, closing and opening in each cycle of the crankshafts, cutting the stock while it is actually in horizontal motion. The stock is fed through friction feed rolls to and through a stripper plate which shuttles back and forth on a horizontal plane with no vertical movement whatsoever.

Fig. 1. Lempco Hypermatic high speed punch press producing butterfly-type lock washers at a rate of 1700 per minute; 450,000 produced without a die grind.



No conventional flywheels are used in the "HYPERMATIC". It, in effect, uses a "flywheel die head" and, at each cut, the force required merely subtracts from the circular inertia of the heads and no perceptible shock load is received by the crank.

The smooth action combined with ample power make possible "jogging" the press through any part of a complete cycle; the 10-ton model can be rotated with a 12" wrench on one of the crankshafts.

The crankshafts rotate in anti-friction bearings, under oil pressure, at both ends of the main housing and in the outer bearing brackets. They are driven through a transmission of precision machined herringbone gears, which is completely enclosed in the main housing and operates in an oil spray.

As yet, very little is generally known about the advantages of velocity in a stamping operation. The Smithsonian Institute has on exhibit a fence post which was penetrated by a wheat straw during a tornado. The National Geographic has on record a live tree which was cut into about 3 inches by a piece of wrapping paper during a cyclone. Both straw and paper were traveling so fast that the inertia of the materials was sufficient to overcome the resistance of the wood. The velocity of the "HYPERMATIC" die heads at upwards of 1000

Fig. 2. High-velocity stamping of 10-24 hex machine screw nuts at the rate of 1150 per minute. Width of the strip stock is the same as dimension across nut flats, hence scrap is at a minimum. Nuts and scrap are separated by agitation and gravity and automatically flow down the respective chutes.

strokes per minute can be likened to this phenomenon, adding stiffness and hardness to the punches and dies used at these speeds.

Punches of even small dimensions stand up unusually well with little or no breakage. The speed of the punch action is like that of a bullet. A 22 caliber bullet, at full muzzle velocity will penetrate a pane of glass as though it had been drilled. A loss of muzzle velocity will establish radial cracks and even remove the entire pane. For these reasons it is not critical as to where the punch and die engage the stock for the first and last "hit" of a strip of stock. The "HYPERMATIC" will stamp out halves, quarters or minute fractions of a stamped part without damage to the punch or cut edge.

The high velocity results in about 10% cut and 90% break producing superior stampings with less burr, distortion and draft than would be ordinarily possible. On the "HYPERMATIC" it is common practice to register the stampings so close together that length of scrap between blanks is less than the thickness of the metal and the metal "stands up" instead of "mushing down" as is customary. On long runs, the stock saving is tremendous.

Fig. 3. Control panel of 10 ton Lempco Hypermatic press. Due to the speeds at which these presses are capable of operating, stock feed, as well as work and scrap conveying and disposal, become major considerations in tooling a job.

★ ★

★ ***Editor's Note: We, of the TOOL & DIE JOURNAL, have been particularly fortunate in being able, here in Cleveland, to observe and report on the development of the Hypermatic press. Our readers will recall first seeing this new press described in TOOL & DIE JOURNAL, October 1945. Its performance is generating a new conception of stamped metal manufacture. E.W.P.*** ★

★ ★

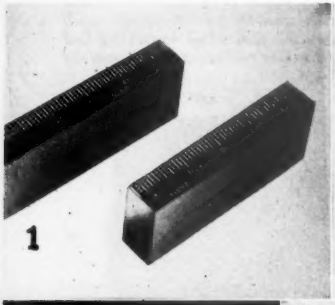
A TDJ FEATURE PRESENTATION

Marking . . . A Die and Stamping Necessity

Interchangeable parts manufacture requires numerous marking operations. Stampings and their respective dies are marked to indicate blueprint and part numbers, type and source of material, date and name of manufacturer, style or model number, and production quantities. Functional and decorative marking is also required, as in the case of calibrated dials and embossed name plates.

War production resulted in a number of unique marking developments, many of which can be applied profitably to current production. Illustrated are a number of such developments by one marking equipment manufacturer.

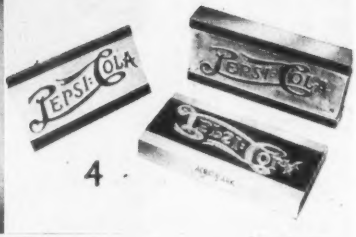
Further information about the marking equipment illustrated, or a complete catalog, may be obtained from The Acromark Co., 5-15 Morrell St., Elizabeth 4, N. J., or by checking INFORM-A-GRAM Key Number 636-Z.


1

2

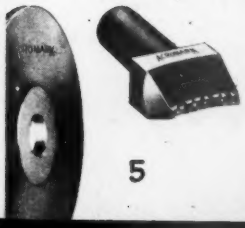
Figures 1 and 2 illustrate new types of dies for use in a punch press. Such dies, for dials, gauges, timing rings and similar parts, result in accurately graduated and numbered pieces.

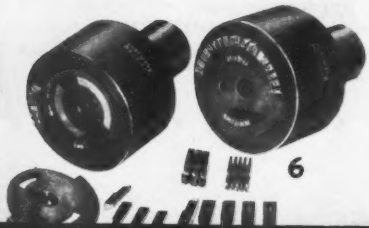
3



4

The embossing and coining dies, shown in Figures 3 and 4, produce a flat engraved face ready for enameling.


5


6

Figures 5 and 6 illustrate a new combination type holder and a wire marking die that may be attached directly to a wire extruder.

Images Reverted To Upright Position By New Locating Microscope

A new locating microscope which reverts the image to its upright position and easily picks up edges, contours, irregular shapes, and holes too small for an edge finder or indicator has been developed by the Moore Special Tool Co., Inc. An optically engineered precise roof prism in the microscope enables the operator to see the work in the same position as it appears on the machine table setup. Table settings can be made

instinctively without the confusion of transposing reversed or inverted table movements as in conventional compound microscopes. Thus less chance for error is the result and accurate performance does not depend on operator skill or experience.

Because there can be no compromise with precision in a microscope whose primary function is accurate location, every detail of the design and manufacture of the Moore Locating Microscope from the precision grinding of lenses to the manufacture of each integral part is carefully engineered for true performance. As a result, magnification of 40X, enough to see a "tenth", is achieved without unduly reducing the field of vision or making adjustments too critical. A field of vision is provided wide enough to include a large portion of the workpiece (a full ¼"). This simplifies picking up a reference point, and enables the operator to establish, in his mind's eye, the relationship of the various contour parts.

In addition to a double pair of cross lines, spaced .001" apart, the Moore reticle contains a large number of conveniently spaced concentric circles whose lines are broken to facilitate locating small holes or large radii otherwise covered by the line. Sufficient reference points on the reticle permit interpolation of contours or picking up of radii at points remote from the center of vision. The crossed lines and large number of concentric circles are helpful in picking up either small holes or large radii, without excessive distances to be estimated or interpolated by the operator; also scribed lines are easily located between the double pair of crossed lines in any direction.

Designed for use in the Moore Jig Borer or Moore Jig Grinder, the microscope extends the usefulness of either machine by converting them into inspection machines for hole location, contour shapes, finish or surface conditions. Locational accuracy is quickly determined

by substituting the microscope for the cutting tools or grinding heads. Work may be checked before disturbing the setup by simply retracing table settings, and comparing positions of holes with original dimensions while the work is still in the machine.

For complete details and specifications write Moore Special Tool Co., Inc., Dept. 5-89, 740 Union Ave., Bridgeport 7, Conn., or use our postage-free INFORM-A-GRAM Key No. 589-Z.

Contour Sawing Practice

(CONTINUED FROM PAGE 83)

Making Punch and Die From Same Piece of Steel

The sawing technique whereby the slug removed from the die is used for the punch is not complicated and the advantages are obvious, i.e., no material waste, a single cut shapes both parts, and steel structure is improved by keeping the grain of both parts parallel. Incidentally, this is a patented technique applicable to DoALL equipment only. Figure 9 shows what happens in the course of the sawing operation, and the table, Figure 10, gives all dimensions governing the technique for steel die blocks from ½" to 6" in thickness.

It will be observed that as there are nine dimensional factors dependent on material thickness, no standard rule of measurement can therefore be applied to the procedure. Contrary to standard procedure, the same saw must be used throughout the entire cut since its width is fixed by the thickness of the die block.

The die block in this case, Figure 9, is 2" thick, so a $\frac{3}{32}$" starting hole is drilled at a 10° angle and the saw machine table is in turn set at a 7° angle. Having gone through the usual internal starting operations in respect to the $\frac{3}{16}$" saw, the cutting proceeds. The saw is started inside the die layout line, intersects this line at the center of the die block and emerges through the block but on the opposite side of the die layout line. It is apparent that the path of saw as the cutting proceeds is, on the top surface, entirely inside the die layout line. Consequently, due to the predetermined angle setting of the table, the slug or punch profile, on the bottom surface, will have excess material outside of the (projected) die layout line. Once the cut is completed, it only remains to band file the die to the outline and then finish the punch to fit the die. After sawing, the amount of straight side on both punch and die will be $\frac{5}{8}$" as shown in Figure 9, but will be increased to approximately $\frac{13}{16}$" through filing, as noted in Figure 10. If all dimensions and settings have been precisely followed, all signs of a starting hole will have disappeared from the final finished surfaces.

As to the sawing time involved, let us assume that the actual die block to be machined is 2" thick and of chromium-carbon steel and of a design and size as shown in Figure 11.

This outline represents approximately 24 lineal inches, and under standard procedure the cutting rate should average $\frac{5}{16}$" per minute. Hence, sawing both punch and die would therefore consume 3 hours, including welds. In this case two $\frac{5}{16}$" starting holes would be drilled at X and X to generate the $\frac{5}{8}$" radii which would require a ¼" wide band; the cut would then be expedited and completed with a ½" wide saw band.

If, however, the die block were contour sawed according to the technique disclosed in Figure 9, the cutting rate per minute would have to drop at least to ¼" on acount of having to use a $\frac{3}{16}$" band throughout. However, both punch and die would still be sawed in 96 minutes as compared to a total of 156 minutes' sawing time otherwise.

Stampings by Contour Sawing

Making a quantity of identical sheet metal parts without dies can or cannot be a profitable course to follow. Let us refer to the graph, Figure 12, showing convergence of cost per piece of making stampings by three procedures now used industrially. The cost of production press work is herewith based on a $100 die cost and a 2000 parts per hour output.

Numerous laboratory tests on short run lots by the Continental process, utilizing thin dies in a shuttle actuating mechanism, show the cost per piece to be at least three times that of conventional press work. The contour sawing technique was then applied to similar lots of blanks so as to arrive at definite cost-per-piece conclusions. All tests subsequently supported by field production

(CONTINUED ON PAGE 150)

War Steel Bar Stock

(CONTINUED FROM PAGE 78)

to keep contamination between tests from being a confusing factor.

Portable Test Kit

If the reader wishes to identify bar stock by the spark test method in the field or W.A.A. warehouse, the following testing kit should be carried:

1. Portable Grinder (220 volt if possible).
2. Black painted Celotex square, 24" x 24".
3. Clear glass goggles.
4. Collection of known specimens.
5. Hack saw (or use an abrasive cut-off wheel on grinder).
6. Vise for holding bar end samples.
7. Chart of Spark Characteristics.

In arranging the testing apparatus, the operator uses the black painted square as a background for the horizontal spark streams. He arranges his vise on a bench and moves the bench to a spot where diffused or indirect light assists him in visually retaining the spark pattern long enough for comparison purposes. Sometimes small diameter bar stock can be placed directly in the vise so that the portable grinder can be used on the bar-end. However, with larger diameter bar stock, specimens have to either be cut off or the portable grinder carried to the stock rack or stock pile and used in an offhand manner across the bar-ends. The operator next checks his visual retention under the prevailing lighting conditions by using a known sample whose chemistry is an approach to the supposed composition of the steel to be identified. This step is important because changes in lighting conditions will affect a person's pattern retention. A chart of spark characteristics assists the operator in checking his observations and impressions of the differences between a known and unknown sample.

Spark Pattern Characteristics

Figure 1 shows some basic spark characteristics which can be visually retained for comparison purposes by the writer's 20-30 eyesight and his mental "negative". However, the writer advises that the operator compile his own chart of known samples as the visual retention and sharp image problem varies with the individual.

The Pellet Test

Help in verifying the spark testing comparison tests is rendered by the Pellet Test, devised by W. G. Hildorf and C. H. McCollam.

The spark stream fades out about thirty inches from the grinding wheel. If a handkerchief or filter paper is positioned at about this distance, a fine dust will fall and collect. This dust is made up of minute "chips or turnings" from the "teeth" of the abrasive wheel and of small pellets which are the chips that burned or were oxidized and thus created the sparks. Sift this dust through a 100 mesh screen and examine them under an ordinary bench microscope at about 30X magnification. The pellets are easily distinguished from the curled chips, and examination of these pellets permits the following identifications:

1. Pellets dark, rounded, and of smooth surface. (Plain carbon steels.)
2. Pellets gray, frosty colored, and rounded irregularly. (Chromium steels.)
3. Pellets black, truncated hollow shells. (Vanadium steels.)
4. Pellets dark, hollow half-spheres. (Molybdenum steels.)

An Additional Printing of the July Sheet Metal Die and Stamping Feature Issue

Enables us to offer extra copies at the regular price of $0.50 each. Order one or several for your own personal reference library. Annual Subscription Rate, including July, $4.00. Write for your extra copy today.

Subscription Department
TOOL & DIE JOURNAL 2460 Fairmount Blvd., Cleveland 6, Ohio

BAUMBACH
35 YEARS OF DIE SET MAKING
THE DIE-SET AUTHORITY
All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.
SURFACE GROUND TO ASSURE PARALLELISM AND HIGH FINISH
DOWELED AFTER ALIGNMENT
E. A. BAUMBACH MFG. CO.
1814 S. KILBOURN AVE. CHICAGO 23, ILL.

data proved without any doubt, as per graph, that contour sawing was more economical than the thin-die method for runs under 500 parts, and likewise more economical than production press work for lots as high as 2000 parts.

As for the procedure to follow in actually shaping "stampings" in multiples, it is quite simple. The stack may be of full machine capacity height, the number of blanks depending, of course, on the material thickness. Scrap material can in this way often be turned into real cash. The parts should preferably be pressed as shown in Figure 4, then lightly bead welded adjacent to the corners, with additional beads in between if the material is thin. An assembly prepared in this way represents, as nearly as possible, a solid block of steel. It now only remains to lay out the top blank and from there on it is just plain contour sawing. Design permitting, somewhat similar results may be had by strapping the parts on to a base plate having sufficient thickness to prevent warping. The procedure applies, of course, to internal as well as external sawing.

"Standard" TURKS HEADS
ROLL 4 SIDES IN ONE OPERATION
"Standard" Turks Heads (adjustable draw plates) draw rod accurately to triangular, rectangular and special shapes—both plain and ornamental. All four sides are rolled simultaneously. "Standard" Turks Heads, universal and plain types, are available in a wide range of capacities, with friction or power driven rolls, tandem mountings and special attachments. Widely used as running-in guide and sizing facility on pay-off side of rolling mills and wire flattening mills. Write for Bulletin TH.
STANDARD MACHINERY COMPANY
1531 Elmwood Avenue Providence 7, R. I.
Mfrs. of Power Presses to 500 Tons, Rolling Mills, Swagers, Turks Heads, Steel Die Sets

field engineering company

complete
engineering
service

•

precision
tool
work

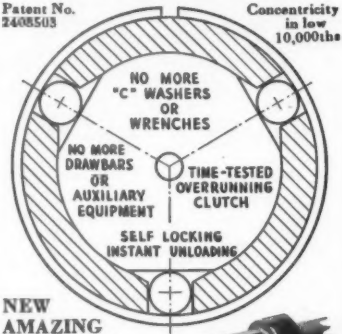
•

styling - processing

3849-51 w. harrison street
sacramento 4171-2-3
chicago 24, illinois

Patent No. 2408503

Concentricity in low 10,000ths


NO MORE "C" WASHERS OR WRENCHES
NO MORE DRAWBARS OR AUXILIARY EQUIPMENT
TIME-TESTED OVERRUNNING CLUTCH
SELF LOCKING INSTANT UNLOADING

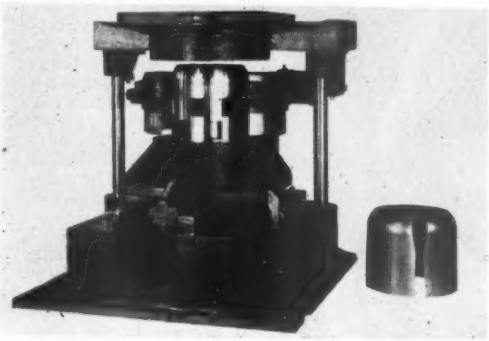
NEW AMAZING MACHINING TECHNIQUE

YOUNG PRECISION EXPANDING MANDRELS
For Production or Inspection

Curtiss-Wright Corporation ranks our product with THEIR best tools. Cleveland Graphite Bronze Company, leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts.

Roughly sketch desired mandrel into your part print and forward for quotes.

YOUNG ARBOR CO. • PH. YE.-9784
3287 Bradford Rd. Cleveland Hts. 18, Ohio



A Product Of F. Jos. Lamb Company

Dies — Jigs — Fixtures — Special Tools — Gages are our specialty.

We also design and build multiple drill heads and special machinery.

We invite your inquiries and stand ready to serve your every requirement for our products.

We will be pleased to mail descriptive folder at your request including a list of our equipment.

ESTABLISHED IN 1914

F. Jos. Lamb Company 6343 Wight Street Detroit 7, Michigan

YOST DRILL PRESS VISE

This new Yost vise has been designed expresely for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

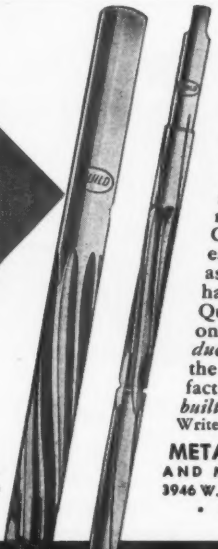
YOST MFG. COMPANY
1000 MAIN STREET
MEADVILLE, PENNSYLVANIA

DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Pa.

GUILD Reamers
HALLMARK OF Precision IN THE MANUFACTURE OF Special Reamers



HIGH SPEED STEEL
In sizes from .025 diam.

CARBIDE TIPPED
In sizes from .090 diam.

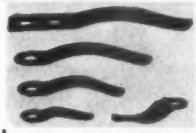
STRAIGHT • SPIRAL • STEP • PILOT • HAND

● GUILD is the new name for an old established line of reamers whose reputation for accuracy has become outstanding in the manufacture of aircraft—motors—engines—small arms—radios—fine instruments, etc. The name GUILD is stamped on each individual reamer as an identification—a hallmark of finest quality. Quality that is possible only by *creative* and *productive* ability far above the average in the manufacture of *reamers specially built for special purposes.* Write for booklet.

METAL CUTTING TOOLS
AND MANUFACTURING CO.
3946 W. Eleven Mile Rd., Berkley, Mich.
• Phone: Lincoln 2-3600 •

What STERLING *is to silver* GUILD *is to Reamers*

ALSCO Self-Locking TOOL and DIE MAKERS' SPRINGS



TOOL and die shops, press rooms, machine shops, etc., will find these handy, neat looking springs the answer to their flat spring requirements. Made in four lengths from 1" to 2¾" and eight thicknesses from .010 to .032.

Immediate Shipment
Samples Upon Request

ALSCO COMPANY 1770 Stone Road Rochester 13, N. Y.

ARTUS ARBOR SPACERS

ARTUS ARBOR SPACERS U. S. PAT.

The COLOR tells the THICKNESS

ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010—.030. Speed up accurate fitting at low cost. Write for folder.

Spacers, Gaskets, Shims
IMMEDIATE DELIVERY

INDUSTRIAL PRODUCTS SUPPLIERS
106 Water St. Dept. T New York 5, N. Y.

Alloy Steel Service From Seven Warehouses!

HY-TEN
AISI SAE

ALLOY STEELS

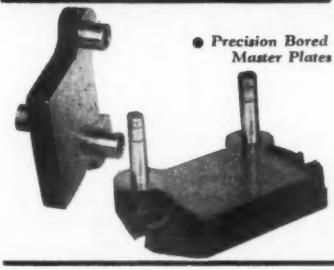
Cutting to length, Heat treating, Forging, Testing, Turning, Special Finishes. Prompt shipment of rounds, squares, flats, hexagons, octagons, and billets. Technical information and recommendations.

Write for our data sheet book.

Wheelock, Lovejoy & Company, Inc.
(Est. 1846)
138 Sidney Street
CAMBRIDGE 39, MASS.
Cleveland 14, Chicago 23, Hillside, N.J., Detroit 3, Buffalo 10, Cincinnati 32

New Guide for Diemakers

DANNEMAN Precision DIE-SETS



● *Precision Bored on Master Plates*

Write for this catalog

ACME-DANNEMAN
National distributors for "Danneman Die Sets"
207 Lafayette Street :-: New York 12, N. Y.

HARDNESS TESTING

has been done with the
SCLEROSCOPE
since 1907

•

THE SHORE INSTRUMENT & MFG. CO., INC.
9025 Van Wyck Avenue
Jamaica, N. Y.

TOOLMAKERS' PRECISION VISES

4 Sizes All Priced To Sell

JOSEPH B. FAKES & COMPANY
1415 ETOWAH AVE. ROYAL OAK, MICH.

CUT ANY SHAPE CLEVERLY with a BEVERLY SHEAR

Regardless the shearing job, straight or irregular, you can do it faster—better with a BEVERLY Throatless Bench Type Shear. Comes in 3 sizes . . .

No. B1—cuts 14 gage—weight 18 lbs.

No. B2—cuts 10 gage—weight 35 lbs.

No. B3—(Equipped with ball-bearing holddown device)—cuts 3/16 inch mild steel or 10 gage stainless, weight 58 lbs.

The Beverly Shear Mfg. Co., 3008 W. 111th St., Chicago 43, Ill. Dept. 7

YOUR NAME'S IN THE POT

When you order STRENES METAL dies from us, they are distinctively yours in metallurgical structure.

By varying cupola changes, we are able to give each batch of STRENES METAL special characteristics in respect to hardness, toughness, density, temperability, acid resistance, magnetic qualities, etc. Knowing the drawing and forming problem, we mix the ingredients of STRENES METAL to meet the requirements.

This explains why STRENES METAL dies deliver an extraordinary number of stampings between redressings, thereby greatly cutting maintenance and production costs.

It will pay you to find out how the advantages of STRENES METAL dies are applicable to your drawing and forming operations. Ask us for specific information.

Strenes Metal DRAWING AND FORMING DIES

THE ADVANCE FOUNDRY CO., Dayton 3, Ohio

Fast **Accurate Measurements**

with the *NEW* AMIC

QUICK ACTION

VERNIER CALIPER

Stainless Steel

THE PERFECT TOOL for machine shop, toolroom, inspection, and quality control, etc.

A flick of the thumb and you've got your external and internal dimensions. Knife-edged, hardened jaws provide exact thread measurements. A depth gage blade gives speedy depth measurements. Made of stainless steel; packed in a sturdy leatherette case. Scientifically engineered, painstakingly machined and American made, the AMIC Quick Action Caliper is a tool without a rival.

Size 6". Graduation 1/40", vernier reading .001, catalog No. 21; graduation 1/40" and full mm, vernier reading .001 and 1/10 mm, catalog No. 22. Also AMIC precision Vernier Calipers, Height Gages, Depth Gages, Pocket Calipers, Precision Graduated Metal Scales.

Write for FREE Booklet A and price list or telephone PEnnsylvania 6-0687

AMERICAN MEASURING INSTRUMENTS CORP.

240 WEST 40th ST. • NEW YORK 18, N. Y.

About Those

"HI-ROCKWELL" DRILLS!

They drill steels with Rockwell Hardness of C35 to C65.

"Hi-Rockwell" Drills are made for production as well as tool-room work.

The production type drills give 40 to 60% greater output. Excellent for glassy or abrasive cast steels or cast iron, fiber-glass or phenolics.

RAY-METAL CO.

RIGID-CARBIDE-TOOLS

Walled Lake, Michigan

Dealers and Distributors Wanted

***Now*–a real heavy duty**

JUMBO CLAMP

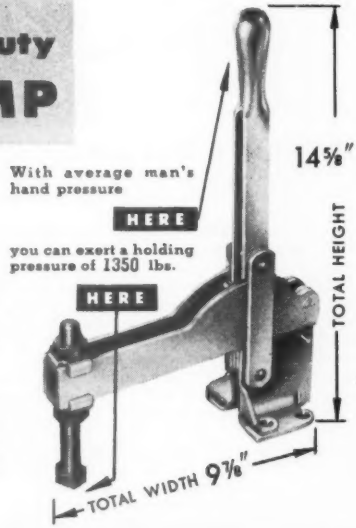
It is the only big clamp we know of that provides for spindle adjustment along the toggle bar.

It has a special designed base having an ingenious, integral front corner and back support, making deflection at spindle only 5/32".

Each clamp comes equipped with an adjustable spindle assembly. However, this can be removed and a special pressure pad to suit your requirements can easily be substituted.

The clamp, catalogued as V-1100, has comfortable hand grip. Weighs 6 lbs.

The recommended pressure is 1350 lbs.



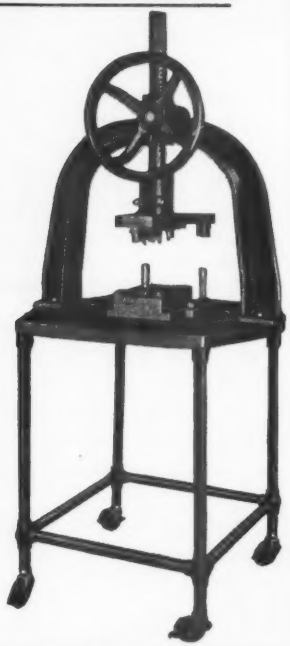
As exclusive manufacturers of clamping devices, we do encounter a wide variety of clamping problems. You will find it very advantageous to draw on this extensive experience. Write for catalog showing full Knu-Vise line of clamping devices.

KNU-VISE INCORPORATED

1330 PLUM ST. DETROIT 16, MICH.

4328 SAN FERNANDO RD. GLENDALE, CALIF.

COMPLETE THE DIE-SET AT YOUR BENCH



LACEY DIE-SET MACHINE

Here is a truly "one man" press that operates with one hand and under full manual and visual control.

Handy for tool and press rooms, it permits the diemaker to complete a die-set *right at his bench* . . . saves tool room and handling costs.

Positive, true punch-to-die alignment is assured at all times, thanks to the Lacey's sturdy, open construction. And punches can be removed as often as needed without disturbing alignment once the die-shoe is clamped to the table and punch holder fixed in position in the ram. No pry bar or hammer is needed to separate punches.

The Lacey Die-Set machine is sensitive for delicate work yet rugged enough for fitting up heavy die-sets. Useful, too, for shearing certain types of punches.

Write today for complete details.

Sole Distributors

MOORE SPECIAL TOOL CO., INC.

740 Union Ave. Bridgeport 7, Conn.

M·B MODEL UTR 60,000 RPM

"UTILITY" Pneumatic

GRINDER

A powerful, fast-cutting tool, streamlined in design, easy to handle. Designed for real production work and the toughest jobs. Precision made, excellent balance. Special grease-sealed bearings . . . no lubrication required. Fitted with steel housing, a special safety feature.

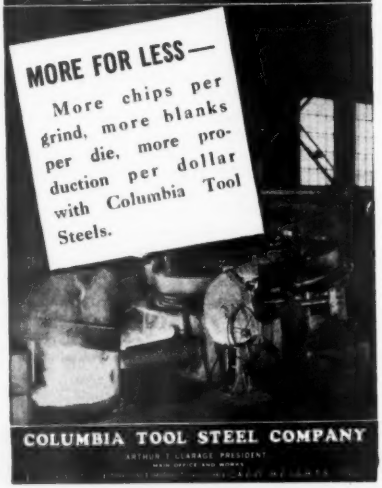
Representatives in Principal Cities

PROMPT DELIVERIES

M·B PRODUCTS

130-134 E. LARNED STREET
Detroit 26, Michigan

Columbia TOOL STEEL



COLUMBIA TOOL STEEL COMPANY

ARTHUR T. LEARAGE PRESIDENT

MAIN OFFICE AND WORKS

MIRROR FINISHES
in Minutes instead of Hours

On Tungsten Carbide, Tool Steels, Special Steels, Chrome, etc.

WITH STAR DUST

Laboratory Graded

Pure Diamond Powders and Diamond LAPPING COMPOUND

Produces super-finishes and polishes down to less than a MICRO-INCH with INCREDIBLE SPEED.

Write us your lapping problems. No obligation.

ACE ABRASIVE LABORATORIES
1 SPRUCE STREET • NEW YORK 7, N. Y.

C T & E C

PRECISION BROACHES

Manufacturers of standard and special broaches. A complete service for sharpening, reconditioning and converting broaches. Standard keyway broaches in stock.

Dependable—Prompt Service

CONANT
TOOL & ENGINEERING CO.
347 WEST 107TH STREET
CHICAGO 28, ILLINOIS

A New DIE-MAKING TECHNIQUE

DIE-CUTTING by ELECTRICAL DISINTEGRATION

WITHOUT DRILLING, MILLING OR CHIPPING

. . . By the Original Manufacturers of Metal Disintegrators.

● Among the many increasing applications for Disintegrator Drilling is the cutting of shaped holes in hard or soft steel, which is done at a big saving of time and money. The illustration shows a number of irregular holes made by this method.

Get further details about this modern equipment. Write for literature today.

Remove
BROKEN TAPS, DRILLS AND REAMERS

By ELECTRICAL DISINTEGRATION

CORPORATION **ELOX** 740 N. Rochester Road Clawson • Michigan Phone, Detroit, Elmhurst 6173

Covered by one or more of the following U. S. Patents: No. 2074048, No. 2209124, No. 2209202, No. 2333385. Other Patents Pending.

THE HABIT OF PRECISION

● Established over a half-century ago to design and build fine surveying instruments *that had to be accurate*, The J. C. Ulmer Company has always made precision a *habit*.

Today this Ulmer habit of Precision Service is paying dividends to many of the outstanding industrial plants of America in the unsurpassed performance of their Ulmer-built tools, gages, jigs, fixtures and special machines.

Write today for our new folder, "Precision Service."

THE J. C. ULMER COMPANY

The Habit of Precision Since 1893

1791 East 38th Street . Cleveland 14, Ohio

SEND US YOUR PRINTS FOR *Quotations*

THREAD GRINDING
BROACHING
MAGNETIC INSPECTION

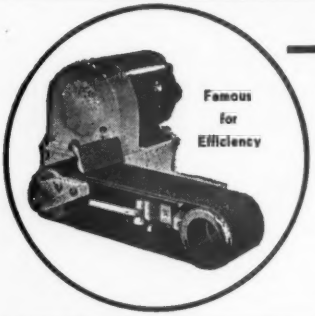
TAYLOR MACHINE COMPANY

MANUFACTURERS OF

AVIATION & AUTOMOTIVE PARTS

Gear Specialists

1917 EAST 61ST ST. • CLEVELAND 3, OHIO



• *HIGH SPEED GRINDING* •

STANDARD D-4 ABRASIVE BAND GRINDER

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit!

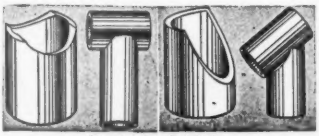
Other styles and sizes in New Manual on Finishing — Write Today

WALLS SALES CORP.

306 E. 38th Street New York, N. Y.

SHEAR TUBING OR PIPE ENDS EASILY WITH

ARC·FIT

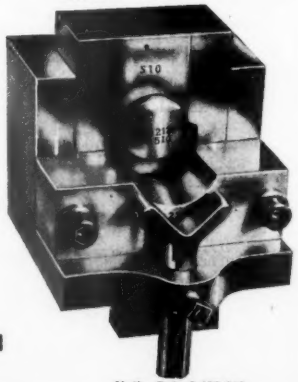


Typical Arc-Fit Cuts

Arc-Fit is a shearing unit for preparing pipe or tubing ends in making welded or brazed tubular joints. Arc-Fit will prepare the ends of a pipe or tube in less than *5 seconds*. Arc-Fit is a production tool that will cut your production costs. It is applicable in any industry where pipe or tubular construction is used.

- Arc-Fit can be utilized in any power press.
- Arc-Fit can be furnished for any size tubing or pipe.
- A hand press can be supplied with Arc-Fit units for shearing pipe or tubing sizes 2 inches or under.
- Arc-Fit does not deform pipe or tube. No grinding or finishing operation is needed.
- Engineers can now design for tubular construction and cut costs.

Write today for circular and prices.



Manufactured Exclusively by

VOGEL TOOL & DIE CORPORATION

2527 Moffat Street

Chicago 47, Illinois

Meth. Pat. 2,126,519

WAKCO WEIGHT RULE

enables you to calculate almost instantly the weight of a piece of metal in any size or shape. Covers aluminum, brass, cast iron, copper, lead, magnesium and steel, in balls, bars, cubes, fillets, hexagonal, octagonal, plates, prisms, pyramids, ¼ round, ½ round, round, wedges, etc. Rule made with all-white plastic with markings protected by overlamination of clear plastic. RULE in case with Instruction Manual $15.50

WARREN-KNIGHT CO.
1886½ N. 12th St., Phila. 7, Pa.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Last for years. Write for Circular.

NIELSEN TOOL & DIE COMPANY
1966 W. Eleven Mile Rd.
Berkley, Mich.

(from 1/8" to 1/2"— from $1.71 to $3.75)

DRILLS

12" LONG

HIGH SPEED
Straight Shank Drills
9-inch flute
IMMEDIATE DELIVERY

EASTERN TOOL SUPPLY CO., Inc.
174 Grand Street • New York 19, N. Y.

FREE COPY
MACHINE SHOP EQUIPMENT—125 page fully illustrated catalog describes a large variety of drills, reamers, cutting and lathe tools, vises, etc.

ROLL-IN

ALL-PURPOSE METAL CUTTING BANDSAW

YOU GET TWO MACHINES IN ONE
A CUT-OFF SAW, gravity feed
CONTOUR SAW, stationary

THIS ONE MACHINE
MEETS ALL
YOUR CUTTING PROBLEMS

4 SPEEDS — 6 BLADE WIDTHS

File Attachment - Welder - Wet or Dry Cut

ROLL-IN SAW COMPANY
PARMA, MICHIGAN

Wendt - Sonis Standard Carbide Tools are available in a wide variety of types and sizes.

FOR COST CUTTING . . . . . ON CUTTING JOBS

- *13 standard Wendt-Sonis carbide tipped tools will perform over 80% of a plant's tool bit operations.*
- *Wendt-Sonis standard tool bits can be supplied with any grade of carbide required.*
- *Standard Wendt-Sonis tool bits are stocked in Carboloy and Kennametal grades of carbide.*
- *Nationwide organization of established W-S distributors stocks complete line.*

W-S standard tool bits are "Color Marked" for easy identification as to use on steel or non-ferrous materials. All shanks are rust resistant. Cutting edges diamond ground for longer wear and better finish. Use W-S carbide tools to increase your production . . . combat rising costs!

***Free!* NEW CHIP-BREAKER CHART**

To get FREE chart WRITE: Wendt-Sonis Company, Hannibal, Missouri or 580 N. Prairie Ave., Hawthorne, California.

WENDT-SONIS

CARBIDE CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • SPECIAL BITS

TOOL ROOM OPTICS

TROUBLE SEEING YOUR LAYOUTS?
DIFFICULTY CENTERING THEM ACCURATELY?

You Need
OPTI-LOCATOR!

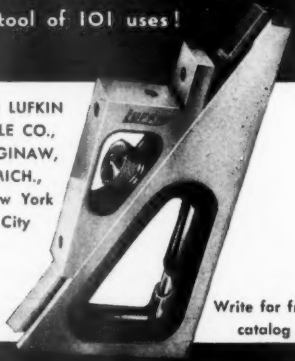
- Functions on any machine with cross-feed.
- Split - thousandth accuracy in 60 seconds.
- Convenient to use . . . cheap to buy.

Write to
THE BENTON CO.
DEPT. T, 351 S. LA BREA, LOS ANGELES, CALIF.

Lufkin Master Planer Gage

•

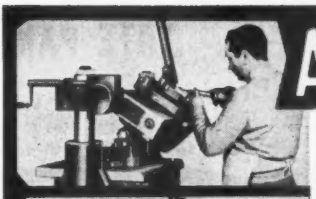
precisely ground, accurately fitted in every detail — The tool of 101 uses!



THE LUFKIN RULE CO., SAGINAW, MICH., New York City

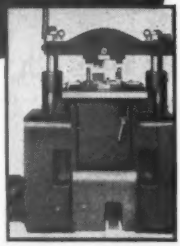
Write for free catalog

LUFKIN FOR ACCURACY



ALPHA

THE NEW DIE TRY-OUT PRESS



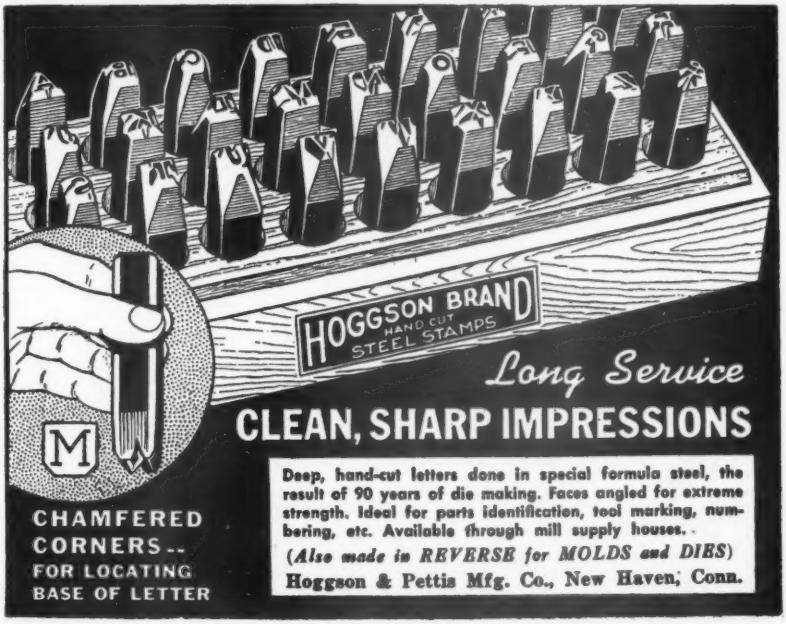
TRY DIES UNDER ACTUAL PRODUCTION CONDITIONS!

FINISH DIES WITHOUT REMOVING FROM PRESS!

Saves time! Saves back-breaking labor! Increases accuracy! Cranks retract locating pins and tilt bolster and head so finishing work can be performed on either member of die. An accurate check on corrections is then possible since die returns to its original position.

Alpha is a production type press that brings to light necessary corrections that are not detected in regular try-out presses.

Write for literature and prices to Alpha Tool Works, 9281 Freeland, Detroit 27, Michigan.



Long Service

CLEAN, SHARP IMPRESSIONS

CHAMFERED CORNERS -- FOR LOCATING BASE OF LETTER

Deep, hand-cut letters done in special formula steel, the result of 90 years of die making. Faces angled for extreme strength. Ideal for parts identification, tool marking, numbering, etc. Available through mill supply houses.

(Also made in REVERSE for MOLDS and DIES)

Hoggson & Pettis Mfg. Co., New Haven, Conn.

TAMMS LAYOUT DOPE

Comes in Blue, Black, Orange, Red. Dries fast. Oil resistant. Won't chip, crack or flake off. Also ideal as marking dye. Get 8-oz. brush-in cans, pts., qts., drums. SAMPLE FREE!

TAMMS SILICA COMPANY
228-TD North La Salle St. ★ Chicago 1, Illinois

New NESTING TYPE
TOTE PANS

20" Long x 12" Wide x 6¼" Deep
16 Ga., drag holes, handles both ends.

J. L. LUCAS & SON, INC.
BRIDGEPORT 5, CONN.

GROUND FLAT STOCK

velvet finish

THE WORLD'S LARGEST RANGE OF STOCK SIZES

(All sizes in stock ready for shipment)

Individually Wrapped and Shipped in Wood Box

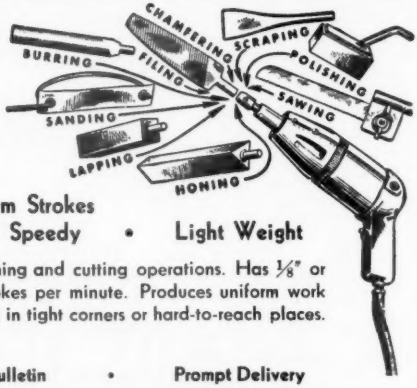
PRODUCTION SURFACE GRINDING on huge MATTISON GRINDERS

Special Sizes Heat-Treated or Soft, Ground to Your Specifications.

Write for New Catalog and Prices—Box 58-A

MARSHALL STEEL LISLE, ILLINOIS

PORTABLE
Electric
Reciprocating Tool



In and Out Action • Uniform Strokes
Speedy • Light Weight

A compact tool used for roughing, finishing and cutting operations. Has ⅛" or ⅜" long fixed stroke. Delivers 1000 strokes per minute. Produces uniform work with high precision. Excellent for working in tight corners or hard-to-reach places. Operates on 110 volts, AC-DC.

Write for Bulletin • Prompt Delivery

PRECISION PRODUCTION TOOLS

ACME TOOL COMPANY

71 WEST BROADWAY • NEW YORK 7, N. Y.

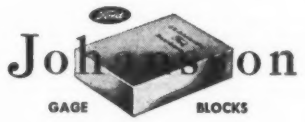
To Measure with Real Precision

GUARANTEED ACCURACIES

±.000002, .000004, and .000008 inches

•

Write for latest illustrated literature



Johansson

GAGE BLOCKS

FORD MOTOR COMPANY

JOHANSSON DIVISION

3613 Schaefer Road • Dearborn, Mich., U. S. A.

REG. U.S. PAT. OFF.

HY-PRO TAPS

More threaded pieces per tap • More resistance to wear between sharpenings • Greater accuracy • Longer life • Consistently higher production at less cost •

Reduce Your Cost per Tapped Hole

HY-PRO High Speed Ground Thread Taps will usually produce at least SIX TIMES AS MANY HOLES as a cut thread tap! In addition, the greater accuracy of these precision taps hold thread tolerances to extremely close limits, thereby effecting tighter, stronger, vibration-resisting fastenings.

Hold down costs and increase production by putting HY-PRO taps on the job. Profit-proved under the toughest shop conditions, these rugged threading tools will pay their way in your tapping operations.

PROMPT DELIVERY

Many special as well as standard taps in stock

COMMERCIAL PRECISION SPECIAL GROUND THREAD TAPS

Send for Catalog & Threading Manual on company letterhead

HY-PRO TOOL CO.

New Bedford, Mass., U.S.A.

Miccro *Supreme*

LAY-OUT AND IDENTIFICATION DYE

12 COLORS*

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of stock and parts . . . Shows up in sharp relief—dries instantly—easily removed . . . Write for circular.

**Purple shipped unless otherwise specified*

MICHIGAN CHROME & CHEMICAL COMPANY

6340 E. Jefferson Ave. • Detroit 7, Mich.

CONTRACT TOOLING AND PRODUCTION

Illinois

PRESS BRAKE DIES
and Punching Attachments for All Makes of Press Brakes
DREIS & KRUMP MFG. CO.
7428 S. Loomis Blvd. Chicago 36, Ill.

DRESEL-BETZ CO.
Belleville, Ill.
Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings

NORTHERN TOOL & DIE COMPANY
330 North Albany Ave., Chicago 12, Ill. Phone Nevada 1613. Designers and Builders of Tools, Dies, Jigs and Fixtures. Gages—Our Specialty.

ROCKFORD DIE & TOOL WORKS, INC.
1816 Seventeenth Avenue, Rockford, Illinois Phone MAin 3084. Designers and Manufacturers Tools-Dies-Jigs-Fixtures. Production Job Work

Michigan

DAVIS TOOL AND ENGINEERING CO.
19250 Plymouth Road, Detroit, Michigan, VErmont 5-6000. Tools and Dies, Special Machinery, Sheet Metal Stampings and Assemblies

LINCOLN PARK MANUFACTURING CO.
3306 Dix Road, Lincoln Park, Mich., ATlantic 8111. Special high speed circular, dovetail, flat form tool bits. Small machines, jigs, gages and experimental parts. Regrinding and salvaging high speed flat form, special bits and small flat broaches. Attractive proposition for representatives.

New Jersey

THE VIKING TOOL & MACHINE CORP.
6 Main Street, Belleville, New Jersey. Tools-Dies-Jigs-Fixtures-Molds-Gages-Machines-Stampings-Specialties

New York

AMERICAN MEASURING INSTRUMENTS CORP.
240 West 40th St., New York 18, N. Y. Jigs, fixtures, gages, dies, precision parts

CONRAD & MOSER
2-23 Borden Ave., Long Island City, N. Y. Machine Tools & Molds, Parts & Machines, Aluminum Cast Parts, Aluminum Sheet Formed Housings

RANE TOOL CO., INC.
17 Ross St., Jamestown, N. Y. Phone 7-175. Specialists in Blanking, Forming, and Drawing Dies

Ohio

CLEVELAND UNIVERSAL JIG COMPANY
13404 St. Clair Ave. Cleveland MUlberry 2600
DESIGNERS AND BUILDERS
Jigs and Fixtures Special Machines
Production Engineering
Complete Plant Routing and Tooling

THE DENNING MANUFACTURING CO.
1775-81 E. 87th St., Cleveland, O., CEdar 0801
Designers and Builders of High Grade Dies

GENERAL DIE & TOOL CO.
2067 W. 55th St., Cleveland, O., WOodbine 4736
Dies, Tools, Jigs, Fixtures, Light Stampings, Special Machinery, Manufacturing

THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, O. Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 2440-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring

NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, Bedford 1234.
Tool Makers—Short Run Production Work

PARAMOUNT TOOL CO.
1392-98 East 43rd St., Cleveland, O. ENdicott 2220. Jigs, Fixtures, Dies, Experimental Work

THE PHOENIX MACHINE CO.
2711 Church Ave., Cleveland, O. CHerry 1048. Contract Grinding, Boring and Planing. Lester-Phoenix Die Casting and Plastic Molding Machines

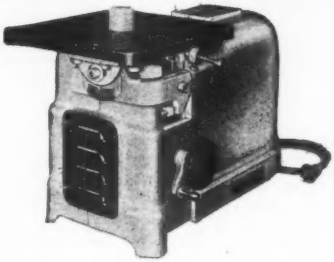
A. P. SCHRANER & CO.
3838 Payne Ave., Cleveland, O., HEnderson 8644. External Cylindrical Lapping Machines, Special Machinery, Tools, Dies, Jigs, Fixtures

THE VARIETY MACHINE & STAMPING CO.
12695 Elmwood Ave., Cleveland, O., LAkewood 8433. Designers and Manufacturers of Dies, Metal Stampings. 250 tons capacity

Philadelphia

ACE MANUFACTURING CORP.
1217 E. Erie Avenue, Philadelphia, Pa., DElaware 6-4141. Precision Grinding—centerless, internal, external, blanchard, surface and thread grinding. Tools & Dies—Metal stamping. Assemblies

for PRECISION FINISHING of Hardened Steel Parts



THE *Milwaukee* PROFILE GRINDER

... promotes extreme accuracy in the precision grinding of hardened steel parts for tools, dies, jigs, fixtures, cams and templates. It is especially adapted to the grinding of curved surfaces and irregular, inside contours, to close tolerances. Lines are extremely easy to follow.

The *Milwaukee* DIE FILER

A companion machine, is designed primarily for straight line filing, sawing and lapping straight lines, plane surfaces or sharp corners in the softer metals, preparatory to hardening.

USE BOTH! The shop with both machines is equipped to handle a full range of "tool and die" work quickly and accurately at low cost! Both are stocked and sold by Machinery and Mill Supply Dealers!

Milwaukee
CHAPLET & MANUFACTURING CO.
1029 S. 40th St., Milwaukee 4, Wis.

Quick Acting JOHNSON FURNACES

TURN THE HEAT ON HIGH SPEED STEELS with JOHNSON No. 130A

FIREBOX 7¾" high 13" wide 16½" long

For low cost heat treating high speed steels, dies, tools. Reaches operating temperatures FAST. Saves time and gas. Counterbalanced door opens upward. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

WRITE FOR COMPLETE SPECIFICATIONS

4-Burner for 1400-2350° F.....$295.00
6-Burner for 1800-2400° F.....$325.00
F.O.B. Factory

FREE CATALOG . . . SEND COUPON

JOHNSON GAS APPLIANCE CO.
873 E Ave. N. W., Cedar Rapids, Iowa

Name _____

Address _____

City _____ Zone ___ State _____

"THE CURB"

FOR SALE · WANTED
EMPLOYMENT · OPPORTUNITIES
CLASSIFIED ADVERTISING RATES—
$2.00 SERVICE CHARGE PLUS 15¢ PER WORD
—PAYABLE IN ADVANCE

★ ★ ★ ★ ★ ★ ★ ★ ★

WANTED—SHEET METAL SCREWS
Any Size — Any Quantity
Address Box DP-747
TOOL & DIE JOURNAL
2460 Fairmount Blvd., Cleveland 6, Ohio

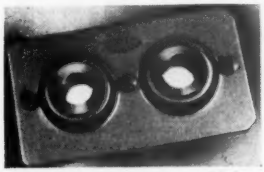
WANTED REPRESENTATION: Several Tool & Die Journal advertisers are seeking active agents to represent them in exclusive territories. Excellent commission arrangements. Inquiries addressed to the magazine will be promptly forwarded. Address Box DR-747, TOOL & DIE JOURNAL, 2460 Fairmount Blvd., Cleveland 6, Ohio.

SALES REPRESENTATIVE WANTED by manufacturer of the finest Die Sets on the market today. Territories available in all sections of United States and Canada. Must be acquainted with die work and have large acquaintance in their territories in this particular field. Commission basis. Address Box ER-747, TOOL & DIE JOURNAL, 2460 Fairmount Blvd., Cleveland 6, Ohio.

DIE DESIGNER: Progressive manufacturer in Midwestern city has opening for man capable of assuming responsibility in die design and die development for light precision stamping. Must have extensive experience in progressive and compound die design together with engineering background. Must have thorough knowledge of high speed automatic feed dies and die frequency improvement. Opportunity commensurate with background. To be considered, replies must include age and specific details of the education and experience as well as recent earning level. Address Box WR-747, TOOL & DIE JOURNAL, 2460 Fairmount Blvd., Cleveland 6, Ohio.

SALES REPRESENTATIVE WANTED by large manufacturer of expansion reamers for various sections of the United States and Canada. Require individuals or organizations willing to do missionary work as well as following up on inquiries. Should have wide acquaintance in prospective territories. Commission basis. Address Box RE-747, TOOL & DIE JOURNAL, 2460 Fairmount Blvd., Cleveland 6, Ohio.

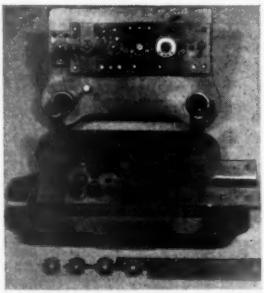
SALES REPRESENTATIVES WANTED, who are now calling on Tool Rooms with other lines, to represent manufacturer of granite surface plates. Liberal commissions and exclusive territories. Address Box RG-747, TOOL & DIE JOURNAL, 2460 Fairmount Blvd., Cleveland 6, Ohio.



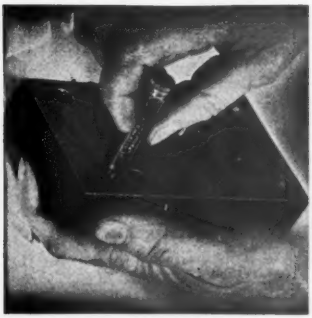
NORTHERN
TWIN RING
GAGES

FOR preferred service in planning and constructing Tools, Dies, Gages, Jigs and Fixtures, consult Northern Tool & Die Co.

Our complete equipment and skilled personnel are also available for special development work beginning with the idea and ending with the finished product.



NORTHERN TOOL & DIE COMPANY, 332 N. Albany Avenue, CHICAGO 12, ILL.



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.

The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 3/16" to 1" diameters.

Send for price list.

HEIMANN MFG. CO.
Dept. T
Urbana, Ohio

ARMSTRONG

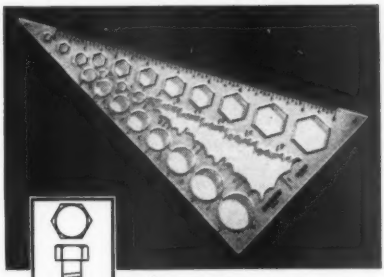
Setting-Up Tools

Few tool investments pay dividends as consistently as an investment in ARMSTRONG Setting-Up Tools.

These correctly designed, strong and convenient tools cut setting-up time to a minimum. They save machine and man hours day after day and assure rigid set-ups for accurate work, prevent accidents and reduce spoilage.

Stocked by Armstrong Distributors
Write for Setting-Up Tool Bulletin

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
340 N. Francisco Avenue
Chicago 12, U.S.A.
New York San Francisco



The **DETAILER**

#201 is a TIMESAVER for the designer, engineer and draftsman. Mathematical-quality plastic sheets laminated to .080 thickness with printing in between for permanence.

Precision cut for accuracy. Inner contours beveled to provide allowance for average pencil line. Actual size of detailer is 10 inches. Templates for plan and elevation of standard hexagon bolts, nuts and screws. Circles from 3/16 inch to 1 inch diameters. Nine inch engineer's scale graduated in 32nds.

Your work will move off your board faster and cleaner with a Rapidesign #201 Detailer!

GET YOURS TODAY! **List Price $3.35**

ANOTHER TIMESAVER TEMPLATE!

RAPIDESIGN INC.
BOX 592 • GLENDALE, CALIF

ARE YOUR TOOLS PRODUCING AT MAXIMUM?

In manufacture of special tools for maximum production the skill of the tool craftsman is the most essential element.

Andersons, Inc., specializing in precision tools and fixtures are so manned and equipped as to assure the best in tool design and craftsmanship.

Your inquiries for special tooling are solicited and will receive prompt efficient service. Let us help you solve your tooling problems.

GAGES, FIXTURES, SPECIAL TOOLS

FORM TOOLS—DOVETAIL AND CIRCULAR MILLING CUTTERS—END MILLS—REAMERS

Write Us or Phone Buckingham 3417

Andersons, Inc.

2329 NELSON ST., CHICAGO 18, ILL.

ADVERTISERS INDEX

Accreylon Corp. 111
Accurate Bushing Co. 51
Ace Abrasive Laboratories 157
Ace Mfg. Corp. 164
Acme-Danneman Co., Inc. 153
Acme Industrial Co. 111
Acme Scientific Co. 139
Acme Tool Co. 162
Advance Foundry Co. 154
Allegheny Ludlum Steel Corp. .....Inside Front Cover
Allied Products Corp. 119
Alpha Tool Works 161
Alsco Co. 153
American Measuring Instruments Corp. 155, 164
Ammco Tools, Inc. 60
Andersons, Inc. 167
Angle Computer Co. 125
Armour & Co. 52
Armstrong-Blum Mfg. Co. .....Back Cover
Armstrong Bros. Tool Co. 167
Atlantic Saw Mfg. Co. 106

Baker Bros., Inc. 26
Barnes Co., W. O. 103
Barth Stamping & Machine Works 106B
Baumbach Mfg. Co., E. A. 150
Bay State Abrasive Products Co. 91
Benchmaster Mfg. Co. 38
Benton Co. 160
Beverly Shear Mfg. Co. 154
Black Drill Co., Div. of Black Industries 3
Bokum Tool Co. 12
Bunell Machine & Tool Co. ...32-33

Carboloy Co., Inc. 99
Carborundum Co. 92-93
Casco Products Corp. 135
Challenge Machinery Corp. 125
Cincinnati Shaper Co. 66
Clemson Bros., Inc. 133
Cleveland Twist Drill Co. 48
Cleveland Universal Jig Co. .. 164
Colonial Bushings, Inc. 125
Columbia Tool Steel Co. 156
Conant Tool & Engineering Co. 157
Conrad & Moser 164
Continental Tool Works, Div. of Ex-Cell-O Corp. 55
Cooley Electric Mfg. Corp. ... 45
Coulter Machine Co., James ... 59
Cratex Mfg. Co. 123
Criterion Machine Works 135

Dahlstrom Mfg. Co. 121
Danly Machine Specialties, Inc. 23
Darwin & Milner, Inc. 121
Davis Tool & Engineering Co. 164
Dearborn Gage Co. 16
Denison Engineering Co. 63
Denning Mfg. Co. 164
Detroit Die Set Corp. 42
Detroit Stamping Co. 64
DeVlieg Machine Co. 39
Di Machine Corp. 58
Diamond Machine Tool Co. 54
Dickerman Mfg. Co., H. E. .. 6
Die Casting Machine Tool Corp. (DCMT) 35
Dreis & Krump Mfg. Co. 164
Dremel Mfg. Co. 96
Dressel-Betz Co. 164
Dykem Co. 136

Eastern Tool Supply Co. 159
Economy Engineering Co. 20
Edroy Products Co. 135
Elox Corp. 157
Enterprise Machine Parts Corp. 49

Fakes & Co., Joseph B. 154
Federal Tool Corp. 136
Field Engineering Co. 151
Firth-Sterling Steel Co. 68
Forse & Co., Wm. A. 106E
Ford Mfg. Co., Inc., M. A. 133
Ford Motor Co., Johansson Div. 163
Fray Machine Tool Co. 115, 129

General Die & Tool Co. 164
General Engineering & Mfg. Co. (GEMCO) 89
Gorton Machine Co., George ... 17

Hamilton Tool Co. 117
Hammond Machinery Builders . 126
Harig Mfg. Corp. 7
Hartford Special Machinery Co. 133
Heimann Mfg. Co. 166
Hoggson & Pettis Mfg. Co. .. 161
Helo-Krome Screw Corp. 5
Hovis Screwlock Corp. 169
Huebner Publications 8, 142-143
Hy-Pro Tool Co. 163

Illinois Tool Works 129
Industrial Machine Co. 164
Industrial Products Suppliers .. 153

J & S Tool Co. 126
Jergens Tool Specialty Co. 129
Johnson Gas Appliance Co. 165
Johnson Mfg. Corp. 119

Kempsmith Machine Co. 31
Kiffer Tool & Die Co. 164
Knight Machinery Co., W. B. 101
Knu-Vise, Inc. 155

Lamb Co., F. Jos. 151
Leach Machinery Co., H. ..115, 129
Lee Co., K. O. 27
Lempco Products, Inc. 138
Lincoln Park Mfg. Co. 164
Linderme Machine & Tool Co. 107
Linley Bros. Co. 113
Lucas & Son, Inc., J. L. 162
Lufkin Rule Co. 160
Lyon-Raymond Corp. 107

M-B Products 156
Maquoketa Co. 61
Marshall Steel 162
Masonite Corp. 57
Mead Specialties Co. 106G
Melin Tool Co., Inc. 18-19
Metal Cutting Tools & Mfg. Co. 152
Michigan Chrome & Chemical Co. 163
Michigan Tool Co. 106F
Milwaukee Chaplet & Mfg. Co. 165
Modern Motor Drives Division, The Nichols Engineering Co. 105
Monarch Machine Tool Co. 46
Moore Special Tool Co. ..36-37, 156

National Machine Tool Builders Assoc. 34
National Machine Tool Co. ... 131
National Pneumatic Co. 106C

Niagara Blower Co. 131
Nicholson File Co. 13
Nielsen Tool & Die Co. 159
Noble & Stanton, Inc. 106D, 106H, 164
Northern Tool & Die Co. ..164, 166
Norton Co. 10

Oliver Instrument Co. 115
O'Neil-Irwin Mfg. Co. 44

Paramount Tool Co. 164
Persson Mfg. Co. 123
Phoenix Machine Co. 164
Production Machine Co. 121
Producto Machine Co. 24
Putnam Tool Co. .....Front Cover

R & L Tools Co. 62
Racine Tool & Machine Co. 53
Rane Tool Co. 164
Rapidesign, Inc. 167
Ray-Metal Co. 155
Rockford Die & Tool Works, Inc. 164
Roll-In Saw Co. 159
Royal Oak Tool Co. 25
Rusnok Tool Works 29

Sanford Mfg. Co. 117
Schraner & Co., A. P. 164
Scully-Jones Co. 106A
Severance Tool Industries, Inc. 113
Sheldon Machine Co., Inc. 136
Shore Instrument & Mfg. Co. 154
Simonds Abrasive Co. 22
South Bend Lathe Works 41
Springfield Machine Tool Co. .. 50
Standard Machinery Co. 150
Standard Pressed Steel Co. 139
Star Machine & Tool Co. 30
Sunnen Products Co. 43

Tamms Silica Co. 162
Tannewitz Works 40
Taylor Machine Co. 158
Timken Roller Bearing Co. 11
Tomkins-Johnson Co. 28
Tools & Gages, Inc. .....Inside Back Cover
Turchan Follower Machine Co. 97

U. S. Treasury Dept. 152
Ulmer Co., J. C. 158

Vanadium-Alloys Steel Co. 15
Variety Machine & Stamping Co. 164
Viking Tool & Machine Corp. 164
Vogel Tool & Die Corp. 158

W.L.S. Stamping Co. 170
Wales-Strippit Corp. 47
Walls Sales Corp. 158
Warren-Knight Co. 159
Watts Bros. Tool Works 152
Welding Equipment & Supply Co. 21
Wells Mfg. Co. 14
Wendt-Sonis Co. 160
West Point Mfg. Co. 56
Wheelock, Lovejoy & Co., Inc. 153
Whistler & Sons, Inc., S. B. .. 87
Wilson, K. R. 65
Wittek Mfg. Co. 9

Yost Mfg. Co. 152
Young Arbor Co. 151

Eliminate

YOUR SPECIAL

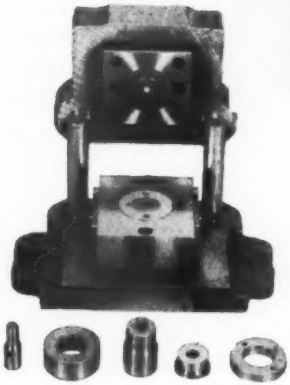
WASHER TROUBLES

WITH

HOVIS

UNIVERSAL MASTER

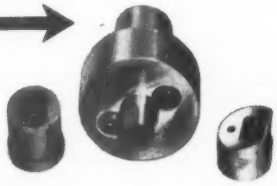
WASHER DIES



Make washers the Hovis way; save time, labor, materials. Simply invest in Hovis Master Dies to meet your requirements, then by using five small interchangeable parts, you can make new size washers, eliminating the necessity of making new dies. You can make washers on short order, saving the expense of keeping large inventories on hand.

A great many manufacturers also use the Hovis Master Washer Die as a holder for making various blanks in their own die room, eliminating the cost of new die sets.

Use This SPECIAL HOLDER →



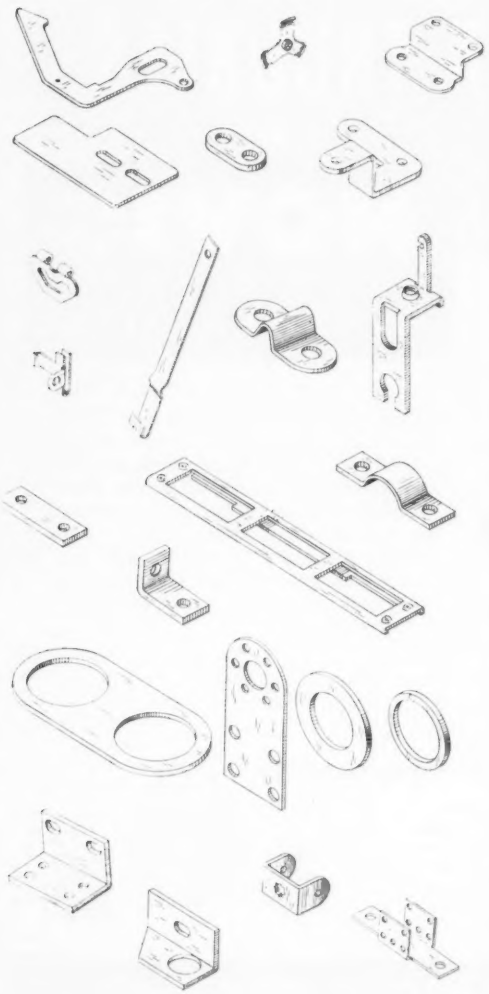
FOR HOLDING INTERCHANGEABLE PUNCHES, COMPOUNDS AND BUTTON DIE, which can be adapted to fit the ram of any press. An inexpensive and valuable accessory. Sizes from ½" to 3". We also specialize in the manufacture of Intricate Punches and Dies.

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD — **Phone: Centerline 1575**

VAN DYKE, MICHIGAN — **Suburb of Detroit**

SHORT RUN STAMPINGS AT LOW PRICES



for PRODUCTION
for EXPERIMENTAL
OR MODEL WORK

OUR SPECIALTY: **Stamping, forming, piercing, extruding or tapping small, irregular shaped parts to your specifications by our NEW — SPEEDY — ECONOMICAL method of semi-permanent dies in conjunction with our quick-process temporary dies.**

For detailed information write us for illustrated folder. For firm quotations and delivery commitments, send us prints or a sample of the part wanted.

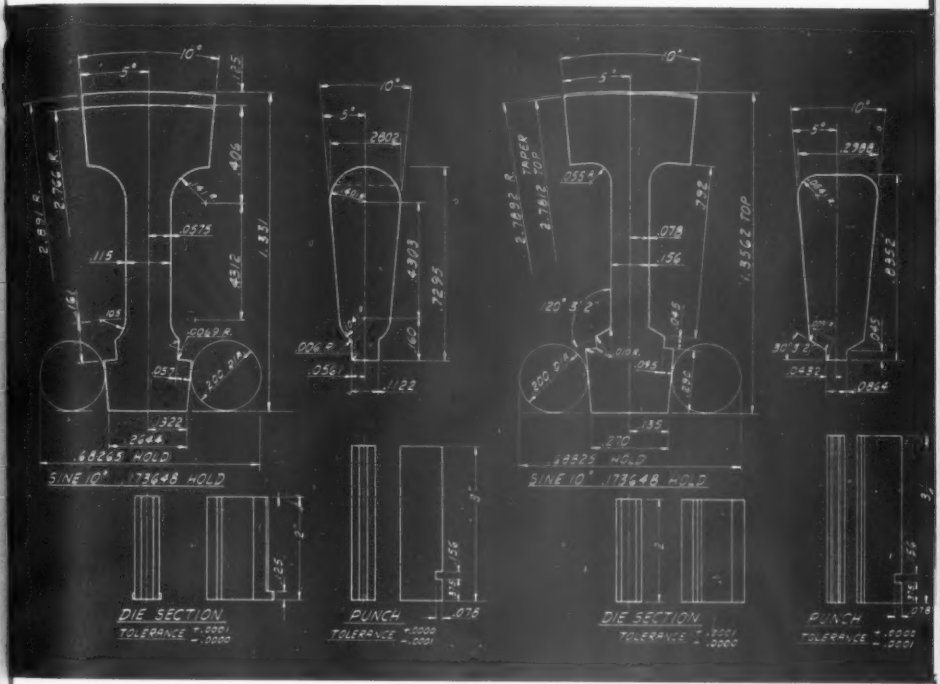
★

WLS STAMPING COMPANY

Short Run Stampings

3290 East 80th Street
Cleveland 4, Ohio

Lamination Die Capacity Available **NOW** *for Complete Dies or Sections*



The above drawings of lamination die sections show the close tolerances which we deliver regularly.

Our 27 years' experience manufacturing intricate dies, tools and gages assures you delivery according to specification. No tolerances are too close for our equipment and craftsmen.

We can take your job *now* and guarantee early delivery.

BUILDERS OF PRECISION TOOLS GAGES • • JIGS • • FIXTURES

TOOLS *and* GAGES

INCORPORATED

3112 EAST 63rd STREET • CLEVELAND 4, OHIO

MICHIGAN 7230

Quickly cuts off accurate lengths from sizes up to 25"x26" cross section

The Crucible Steel Company of America with 26 branch warehouses and sales offices, has built a reputation for anticipating customers' needs, not only in high grade and special steels, but in service requirements as well. They were among the first to equip several of their warehouses with modern high speed MARVEL Saws (No. 6 and 9A series) in order to give fast service on either single lengths or large quantities of identical pieces, accurately cut from bars up to 10" x 10" cross section. Now in anticipation of new demands for larger sizes, they are the first steel company to install a No. 24 MARVEL Hydraulic Hack Saw in order to give fast service on orders for steels of any type *in sizes up to* 25" x 26" cross section.

This giant hack saw, which almost qualified as a "secret weapon" because it contributed so materially to our production capacity in building naval ordnance, applies an entirely new principle of reciprocation that has made "hacksawing" of large work practical for the first time.

Whatever your metal sawing problems, there is a MARVEL Saw exactly suited to your needs. A MARVEL field engineer will be glad to go over your metal sawing problems with you.

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 BLOOMINGDALE AVENUE, CHICAGO 39, U.S.A.

No. 24 MARVEL giant Hydraulic Hack Saw. (capacity 24" x 24"). Employs new "Roll Stroke" sawing action and trouble-free low pressure hydraulic control.

No. 9A MARVEL Production Saw (capacity 10" x 10"). Automatically feeds, measures and cuts-off identical lengths from single or nested bars with no more operator attention than an automatic screw machine.

No. 6 MARVEL Saw (capacity 6" x 6"). A high-speed, heavy-duty, all-ball-bearing saw—operates up to 149 strokes per minute, cuts thru 64% of each stroke, returns in 36%.

MARVEL SAWS

ARMSTRONG-BLUM MFG., CO.

"The Hack Saw People"

5700 West Bloomingdale Ave., Chicago 39, U.S.A.

Eastern Sales Office: 225 Lafayette St., N.Y., 12